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THE NAVAL AVIATION SAFETY REVIEW

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CLOCK & SCIENCE

Special Maintenance Report

The Editors call your attention to the following excerpts from the report "Mech 61" in the mails now. Seldom does one command have the opportunity or occasion to pass on such significant information. While this report was prepared initially for aviation maintenance personnel and their supervisors, as well as the Bureau of Naval Weapons, we believe that every skipper, every pilot, indeed every officer connected with naval aviation, every squadron chief and every career appraisal man should read and think about the implications of this report.

While it is not good news (and as matter of unfortunate fact the record is worsening this fiscal year so far) the fact remains that the news in this report could be a lot worse were it not for the efforts of thousands of dedicated white hats, chiefs and officers.

The report, without saying so, seems to us to urgently emphasize that the turnover, the training, the supervision, the morale, of all personnel, especially those in maintenance who hold lives and readiness in the hollow of their hand, is more than a temporary manning or recruiting problem. It ranks high as a safety problem.

Finally, this report should be reviewed not with a view toward correcting these specific problems, but of anticipating the most probable trouble areas, both in human relations and maintenance, and applying imaginative preventive effort.





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DURING the past fiscal year 353 mishaps were reported wherein errors in maintenance and servicing were involved as cause factors.

Of these, 57 were classified as aircraft accidents in accordance with the provisions of OpNavInst 3750.6D.

Since accident rates are universally used as measurements of performance in aviation safety, these 57 accidents were used to calculate a maintenance error involved accident rate which then was used to indicate the magnitude of this problem and its current trend.

Based on this, it was found that errors in maintenance and servicing were involved

in nearly 10% of all Navy and Marine Corps aircraft accidents, or stated differently, 1 in every 10 aircraft accidents involved maintenance error as a cause factor.

This is a significant increase over the previous year when 1 in every 12 aircraft accidents involved this cause. The increased involvement and rising trend is a result of an overall accident rate decrease of approximately 11% from that of the previous fiscal year, and an increase in the maintenance-error-involved accident rate of 4% during the same period. Of course this is just part of the problem—(the number of incidents, both reported and unreported, involving these factors is suspected to be additionally significant to say the least!—Ed.)

Five fatalities, forty-four injuries and over \$15 million is the price of the 353 occurrences. Manhours lost are beyond computation.

Most Common Occurrences

Inflight opening/loss of windows, doors, hatches, accessory plates, cowling	33
Loss of external stores	25
Canopy jettisoning or canopy actuator fired	22
Disconnected engine and flight controls	20
Engine, landing gear and flight control interference	19
Damage incurred during folding/spreading of wings	15
Ground retraction of landing gear	12
Structural damage or fire during refueling	11
Aircraft falling off jacks	7

The above listing serves to point out some of the most common causes of maintenance error.

For Example:

The large number of inflight loss of hatches, panels, cowling and accessory plates were mostly the result of failure to perform the basic maintenance function of securing fasteners. *Inadequate inspections* permitted the discrepancies to remain uncorrected.

Losses of external stores, the second most frequent occurrence, were largely the result of incorrect installation, inadvertent actuation because of unfamiliarity and failure to use proper procedure. In this type occurrence, inadequate training appears to be the basic underlying cause.

Canopies jettisoning or canopy actuators firing was mostly the result of failure to properly install safety pins. Unfamiliarity caused by inadequate training is indicated in many of these instances.

Prevention Areas

The brief accounts of occurrences are useful in pointing out specific errors which are applicable to many aircraft systems and provide another basis for preventive action. For example:

In 24 instances, damage or injury resulted from miscellaneous articles adrift; in 8 of these, the

articles were tools. The requirement for better housekeeping and tool accountability measures is obvious.

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There were 15 reported instances of failure resulting from omissions or misuse of cotter pins, lock wire and lock nuts. This problem is practically traditional and although attention has been directed to it in all phases of aviation maintenance, it continues to exist.

There were 6 mishaps in which failure to discover and adequately correct repeated yellow sheet discrepancies was determined to be an involved cause factor. This points out the necessity for implementation of the quality control function to include monitoring past discrepancies and associated corrective action to discover trends.

Who Makes the Errors?

Some indication as to who commits errors can also be obtained through analysis of the brief accounts. For example: 23 of the 353 mishaps were the result of errors by O&R personnel, thus illustrating that even in activities where maintenance is conducted under some of the best possible conditions, renewed preventive action is necessary.

Statistics Maintenance and Servicing Errors by		Maint	enan	ice and Se		Errors b	y
				Mod	el		
System		F8U	59	R5D	6	TV	3
Airframes (Structures)	89	A4D	47	T28	6	T34	3
Landing Gear	61	FJ	27	HRS	5	R4Y	2
Powerplants	52	HSS/HUS	26	T2J	5	F2H	2
Ordnance	35	TF/S2F	24	T2V	. 5	F4H	2
Fuel	34	A3D	21	HTL	4	F11F	2
Flight Controls	30	F3H	18	SNB	4	HOK	2
Helicopter Rotors/Trans/Drives	18	F4D	14	HO4S	3	R4D	2
Electrical/Instruments	13	F9F	13	F3D	3	HSS2	1
Brakes	7	AD	18	P5M	3	HR2S	1
Catapult/Arresting Gear	7	P2V	10	UF	3	PBM	1
Air Conditioning/Pressurization	4	HUP	8	WV	3	WF	1
Hydraulic	3					R4Q	1
Total	353					Total	353

While briefs of occurrences are arranged by model aircraft and system involved in the complete report to facilitate use as a training aid: it is not intended that the reader be so selective that he reads only those briefs in which he has a particular current interest.

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Similar errors appear in various models of aircraft and aircraft systems, and a detailed study of the entire report, particularly the briefs, provides valuable information and permits analysis from any point of view. The study does not provide a simple universal solution, but presents all the data available on this subject, and indicates how this data can be utilized to prevent errors in maintenance and servicing. Here are a few examples:

Airframes

HSS-1—During check of the tail pylon for alignment the top hinge bolt was removed to install the alignment pin. Before the pin was inserted the pylon was folded, causing the lower hinge fitting to break. The pylon fell to the ground.



F8U—Nose cone came off in flight and struck the windshield. The latches were not secured properly prior to flight.

F4D—The plane fell off the jacks as it was being lowered to the deck during a major inspection. One of the jacks being used had faulty seals and no lock ring. It failed during the lowering process.

F8U—Ammunition compartment door was lost in flight. The door had been opened the night before the flight and not secured.

HSS-2—Due to a loss of power in the port engine a water landing was made. As the helicopter was water taxiing to the base the right engine quit because of fuel exhaustion. Before a tow could be effected, the helicopter rolled over and sank. The engine failure resulted from material failure. The sinking was caused by the failure to replace two "rivnut" low point drain plugs in the starboard sponson. This caused loss of watertight integrity.

F8U—A functional test of the emergency power package was being performed and when the PC-1 hydraulic pressure was applied, the wings and ailerons were damaged. The aileron battens were not removed prior to the functional test.

F8U—Wing hinge access panel separated from the aircraft in flight because it was improperly secured. The plane captain and pilot failed to detect and correct this discrepancy during preflight inspections.

A3D—The starboard wingfold cylinder was removed in order to permit repair of broken wingfold fittings. The starboard wing was then lowered by using a crane. The port wing was spread by using hydraulic pressure. During the time the hydraulic system was pressurized the forward locking pin in

the starboard wing entered the spar cap ‡ inch. With pressure up a hydraulic leak was observed in the starboard wing area. During an attempt to raise the starboard wing with a fork lift in order to repair the leak a loud noise was heard as the wing began to fold. This was the cracking of the spar cap. Maintenance personnel had failed to check the position of the locking pins prior to lifting the wing.

F8U—The pilot noted that the cockpit wingfold actuating lever was hard to move. A hydraulics man corrected the discrepancy, left the lever in SPREAD with the wings folded and reinstalled the wing locks. When the aircraft was turned up for the next flight, it received substantial damage when hydraulic pressure damaged both wingfold assemblies and actuator cylinder rods. Both outer wing panels had to be replaced.

functioning dynamic brake relay. A long history of landing gear discrepancies on the yellow sheets revealed the only maintenance action taken was a dropcheck.

F8U—During landing the nose wheel stuck in a hard right turn causing the plane to run off the runway and incur overhaul damage. This was the result of a short circuit in the nose wheel steering cut out limit switch and failure of the follow-up potentiometer. This plane had a history of 22 yellow sheet complaints involving nose wheel steering in a two-month period. Action taken to correct the deficiencies in nose steering was not thorough. A3D—An airman was inflating the nose landing gear strut with the high pressure side of an air compressor. After two attempts to inflate the strut with no strut piston movement and 2000 psi on the

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Landing Gear

F4D—During a landing rollout, following a test flight, a turn to the right could not be made so the engine was shut down on the runway. The nose gear wheel well was damaged because attaching pin 2271844 had backed out. It had not been positively engaged by the holding bolt during installation.

SNB—After a takeoff the landing gear handle had to be recycled to retract the gear. The warning light remained ON throughout the flight. When a landing was attempted the gear could not be extended electrically and was lowered by cranking. The warning light and horn remained ON but a visual inspection ascertained that the gear was down. A landing was made and as brakes were applied just prior to stopping the main landing gear collapsed. The pilot had not completely lowered the gear by cranking. The initial cause of the gear failure to extend was suspected to be a mal-



compressor gage, a third application of air was applied to the strut. The airman stepped on the tow bar attached to the strut and the strut exploded. The plane received substantial damage and the man was injured.

F4H-As the engine was turning up to check for engine fuel and oil leaks, a mechanic walked too close to the aircraft and was sucked into the intake. His jacket, glasses and sound attenuating equipment were ingested before the engine could be shut down. The man was fortunate enough to have only been injured. Substantial damage was caused to the aircraft and the engine required overhaul. Ground safety intake screens were not used. T2V-The engine flamed out on the downwind leg of final landing. The plane was ditched and received strike damage. The flameout was caused by separation of the no. 12 fuel line, MS28741-6-0140, which connects the fuel manifold to the air adapter. The line was not torqued in accordance with the HMI.



F8U-After becoming airborne the aircraft pitched up slightly then nosed over into a dive. The pilot ejected but received fatal injuries because the drogue gun failed to fire. The plane exploded on impact with the ground and received strike damage. The accident resulted from failure of the no. 4 combustion chamber, caused by an improper seam weld at the juncture of the no. 2 and no. 3 outer liners. The combustion chamber was installed in the engine at overhaul and the incomplete welding was unnoticed. The failure caused the fuel spray to be deflected toward the diffuser case and resulted in fire penetration through the inner walls of both diffuser cases and the bearing support. It was suspected that the drogue gun failed because it had not been cocked.

P2V—The aircraft landed fast and touched down halfway down the runway. Reverse pitch was selected but forward thrust was received. The brakes were locked, causing both main tires to blow. The plane skidded off the end of the runway. Misrigging of the reverse lock allowed an RPM increase without reversing the blade pitch. The HMI was not adhered to during the throttle adjustment. The aircraft received substantial damage.

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S2F—Due to a high fuel consumption on the right engine, a precautionary landing was commenced, at which time a fire developed in the accessory section. It caused limited damage before it was extinguished. The cause of the fire was a fuel leak from a loose pressure line fitting at the carburetor. The elbow fitting had not been properly torqued during engine installation.

AD—Because of supervisory error the aircraft was permitted to fly, even though the engine log book contained a note that the engine was unsafe for flight. The log showed low compression in four cylinders and loose exhaust valve guides on seven cylinders. The engine failed shortly after takeoff, but the pilot was able to land safely on another runway.



AD—After an hour of IFR flight the pilot noted a partial power loss and a steadily decreasing RPM. As the pilot lost altitude he requested an alternate field for an emergency landing. The available field was IFR in mountains and unfamiliar to the pilot. The sink rate was 200 fpm at 2500', 32" map, 1150 rpm, speed 100-150 knots, when a passenger saw the field. The pilot was too high for the first runway so he took the second one. The landing was too fast and too far down the runway. The pilot thought that there was an abrupt drop at the end of the runway, so he attempted to takeoff and go around. The aircraft struck the ground outside the field boundary. Two persons were injured seriously and one received minor injury. This accident was caused by failure to install a cotter pin in the propeller governor control lever nut and bolt. The nut and bolt had fallen off and left the pilot with no control of the propeller. Proper supervision or a detailed inspection after connecting the controls could have prevented this.

Ordnance

F3H—Ordnance personnel were performing an ASM-11 launcher system test with a live side-winder on Station 3. When position 14 was selected, the missile motor fired causing overhaul damage to the aircraft. A circuit check with a live sidewinder on the plane is in direct violation of test procedures.

F8U—The sidewinder fell off the plane during takeoff because it was not properly secured. The ordnance loading was not inspected before flight.

F4D—During flight the Aero 20A bombrack with Delmar reel was lost from the plane. The bombrack forward mounting bolt had worked loose causing the rear bolt to fail from overstress. The selflocking nut on the mounting bolt had been reused even though it was worn out. It also was not properly torqued.

Powerplants

F4D—When the throttle was retarded to IDLE in the landing pattern the engine flamed out. A successful relight was made in manual control and the aircraft landed safely. An investigation disclosed that the fuel control had been improperly rigged in IDLE so that the quadrant pointer was at the rearmost side of the idle mark.

F4D—On a test flight, following a major check and engine change, the throttle control became disconnected and the RPM stabilized at 82%. During the subsequent landing the left tire blew out and the aircraft ran off the runway. Self-locking nut AN363-428 had backed off the power lever connecting bolt resulting in a disconnected throttle. The nut had lost its locking qualities because of reuse. The throttle balance mechanism was not adjusted in accordance with HMI.



Fuel

F9F—The engine flamed out during the landing approach and the aircraft was ditched at sea. The pilot suffered fatal injuries and the plane was a strike. Fuel exhaustion occurred after a false fuel quantity had been indicated by a malfunctioning

fuel quantity indicating system. The plane had a history of unreliable fuel quantity readings and adequate trouble-shooting and corrective maintenance had not been performed.

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F3H—Overhaul damage to the aircraft wing structure occurred during refueling due to failure of the fuel shut-off valve in the port wing cell. Maintenance personnel failed to check the fuel shut-off valve for proper functioning in accordance with the HMI.



F8U—During pressure refueling the main fuel cell ruptured and the aircraft received overhaul damage due to overpressurization. Investigation revealed that a red wiping rag had been jammed into the tube assembly of the fuel vent installation sometime during removal of the tail. This prevented proper functioning of the fuselage fuel vent system.

A4D—Immediately after takeoff a severe fire developed in the aft section of the fuselage. The pilot made an emergency landing, but the plane received strike damage from fire. Investigation revealed that the fire was caused by loose lines at the primer solenoid. All B-nuts attaching the lines to the fittings were loose and leaking. During fuel



integrity test, following periodic inspection, insufficient inspection was conducted in this area.

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T28—After refuelng the pilot took off for a series of touch-and-go practice landings. The engine cut out at about 250' after the first touch-and-go landing. A wheels-up landing was made on the runway overrun near the field boundary. The pilots escaped uninjured, but the aircraft was destroyed by fire. This T28 had been refueled with aviation gasoline contaminated with 70% JP-4. Even though the refueler was marked as an aviation gasoline refueler, it had been loaded with 2580 gallons of JP-4 fuel.

F3H—The plane captain failed to remove the port wing vent plug before pressure refueling. During the refueling operation the port wing cell ruptured due to over-pressurizing.

FJ—While the aircraft was orbiting the ship the engine flamed out due to fuel exhaustion. The plane was ditched at sea. An investigation disclosed that after the previous flight, the fuel gage was reported to be indicating 1200 lbs high. The electrician did not defuel or refuel the aircraft prior to calibrating the gage, therefore the discrepancy was not corrected. The plane captain also erred during refueling because he used the gage to judge when the tanks were full instead of visually inspecting the tanks for the amount of fuel.

Flight Controls

HUP—As the rotors were engaged during maintenance turnup following an intermediate inspection the aft set of blades flapped down and damaged the fuselage substantially. Investigation revealed that the aft transmission had been removed during the periodic inspection and when the transmission was reinstalled, the controls were misrigged. The improper rigging resulted from the use of a deformed

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rear swash plate rigging tool and failure to install rigging pins during the process of replacing the rear screwjack chains and cables. The aft control chains were installed while the cyclic stick was out of the neutral position. When the cyclic stick was set in the neutral position during the rotor engagement, the rear swash plate assumed the down, forward and to the right attitude, which caused the aft rotor blades to damage the fuselage. The crew was not fully trained or experienced in the maintenance of the HUP.

A4D—While flying at 1000' and 230 knots on a low-level reconnaissance flight, the stick jammed in a 50 degree right bank. The pilot's desperate force against the jammed control decreased the angle of bank sufficiently to narrowly avert crashing into a ridge. Altitude was gained and the power boost was disconnected, which restored aileron control. A safe landing was made. Investigation disclosed that the stick jammed because of binding of the control stick upper arm forward pivot bearing AN201KIGA. The binding was caused by improper assembly of the bearing in the yoke during PAR.

Rotors/Transmissions/Drives

HSS-1—The plane captain lockwired the horn lock pin in the disengaged position. This was overlooked by the pilot on preflight inspection. During engagement the blade bent and struck the deck.

HRS—The tail rotor drive shaft disconnected in flight and directional control was lost. An autorotative landing was attempted and overhaul damage to the aircraft was sustained. Investigation revealed that the tail rotor drive shaft disconnected from the female coupling assembly S14-35-5081-2, because the retaining bolt backed off. The bolt had not been lockwired when the drive shaft was installed by maintenance personnel.



Electrical/Instruments

F3H—The landing gear failed to retract after takeoff because an electrical lead was improperly routed and cut too short to be connected properly

to the starboard main landing gear scissor switch. The lead was broken and not clamped to the strut as required. After several attempts to cycle the gear, without any indication of a gear position change, the aircraft landed. The landing gear collapsed as the airplane touched down. The pilot had left the landing gear handle UP in order to transfer fuel, which resulted in substantial damage and engine change.

F3H—An afterburner takeoff was aborted because of no airspeed indication. The arresting gear was engaged and one tire blew after the aircraft stopped. The pitot and static lines were crossed at the airspeed indicator instrument. The work was not properly inspected, nor was a functional test made of the system.



Brakes

FJ—The takeoff was aborted at a speed of 80 knots. As the plane approached the end of the runway the right brake faded out. The plane ran off the side of the runway incurring overhaul damage. The brake failure was caused by improper adjustment of the brake assembly threaded spring guide retaining ring. This caused a dragging brake, which induced heat and subsequent brake fade.

Arresting/Catapult Gear

F4D—A barricade engagement was made after hook skip on three successive carrier landing attempts prevented a normal arrestment. There was insufficient fluid in the arresting gear dash pot because of a leak at the snubber gage. During servicing of the snubber, maintenance personnel had replenished the air pressure but had neglected to check the fluid level.

F8U—During a catapult shot from a carrier the tube holding the holdback assembly and hook assembly to the keel broke and the entire holdback pin was left on the deck. The plane was routed to a shore base where a safe landing was made. Inves-

tigation revealed substantial damage to the tail section which was caused by installing an undersized bolt.

F3H—During a CV catapult launch the tension bar parted normally when the cat fired, but the catapult hook separated from the plane after 2' of roll. The pilot heard the noise, saw pieces of ilying metal, secured the afterburner and throttle, and stopped the plane 30' from the bow. The plane sustained substantial damage. The cause was failure to tighten and torque the catapult tow fitting attaching bolts during reinstallation. The fitting had been removed for inspection of the fuel cell during a 120-hour check. No work order was issued and the crews were changed before completion of the work.

Air Conditioning/Pressurization

F8U—The canopy plexiglas shattered at 18,000'. An emergency was declared and a landing was made with the face curtain streaming in the wind. It was found that the static vents had been clogged by cleaning compound when the plane captain cleaned the aircraft. Preflight inspection by the plane captain and the pilot did not detect the deficiency.

F8U—During the turnup the pilot began to check the cabin pressurization when he noted a very rapid increase in pressure. He quickly turned the pressurization switch to CABIN DUMP and then started to open the canopy because he believed that the pressure was not being dumped rapidly enough. When the canopy lock hooks rotated sufficiently to unlock the canopy it was blown to a height of six feet and fell to the concrete ramp after striking the top of the fuselage. The mishap was caused by covering the cabin pressure regulator static vent with masking tape to paint and install decals on the side of the fuselage. Tape was not removed prior to turnup.

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Hydraulics

S2F—A fire developed in the right engine accessory section during flight. An immediate emergency landing was made, but the right main gear had not fully extended prior to touchdown and the plane received substantial damage. After the fire was extinguished an investigation revealed the cause to be a leaking quick-disconnect fitting on the hydraulic pump pressure line. The fluid seeped through the nacelle skin and was ignited by the exhaust flame. The disconnect fitting had not been properly tightened and locked during inspection.

F3H—After a maintenance turnup, hydraulic fluid was noted dripping from the aft fuselage. The beaver tail was removed, but the leak could not be



found. The beaver tail was reinstalled and the engine turned up in order to find the leak. When the afterburner was engaged a fire developed in the tail section and caused substantial damage to the airframe. The hydraulic leak was caused by a loose hydraulic line coupling nut which had been undertorqued.

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S2F.—The port wing failed to fold when the selector valve was placed in the fold position. The wing was finally folded by actuating the wingfold lock T-handle smartly. The trouble was thought to be paint on the mechanical lock pins and dirty lock straps. After cleaning the pins and straps, the engine was started with the selector in the fold position and the right wing began to spread. The lock pins prematurely extended, and even though the selector was cycled, the wing went to the spread position, damaging the wing butt structure. In this instance, troubleshooting was incomplete and the malfunctioning selector valve was not discovered until after the damage was done.

The cause factors given the broad classification of "maintenance and servicing errors," include all incidents, flight hazards and ground accidents, in which these cause factors were involved during fiscal year 1961.

This includes errors in workmanship committed

by the mechanics or technicians, errors in judgment or procedure committed by maintenance supervisory personnel and errors due to erroneous or incomplete maintenance instructions.

Not included in the study are ground handling errors, unless they are directly involved in the maintenance of aircraft, and likewise errors in the maintenance of ejection seats (or the full scope of design errors or failures which set the stage for potential goofs, or mistakes—Ed).

Previous studies on this subject have determined, in general, that although the complexity of modern aircraft results in greater exposure to maintenance error, most errors are of the simple type.

In addition, it was discovered that the same or similar errors are repeated over and over again. These findings strike at the heart of the problem, since they indicate that the expected improvement through elimination of previously reported errors is not being realized. In fact, where errors in maintenance and servicing are involved, past mistakes appear to have little effect in preventing recurrences. (As differentiated from pilot reports, where some, but only some progress, has been made in eliminating previous common mistakes.—Ed)

"MECH '61":

 Points out the magnitude of this problem and its present trend.

Continued • Focuses attention on the most common errors.

Indicates courses of action to alleviate this problem.

 Provides specific information for use in maintenance training.

Summary of Findings

The increased involvement of maintenance error in aircraft accidents is a matter of very serious concern to all who are involved in the operation and maintenance of aircraft.

As other cause factors and the overall accident rate show a steady decrease, the maintenance error involved accident rate is rising. To reverse this trend and reduce these avoidable errors, intensified action is mandatory. Present preventive programs are not producing results and must therefore be considered unsatisfactory.

The direct causes of maintenance errors are:

1. Poor workmanship, resulting from:

a. Lack of training.

b. Inattention.

c. Failure to follow published maintenance instructions.

- d. Unfamiliarity with or disregard of accepted shop and general maintenance practices.
 - 2. Inadequate inspections, resulting from:

 a. Absence of qualified inspector at completion of maintenance.

 b. Inattention by inspectors (quality control and pre-flight).

c. Failure to perform functional check or final test.

Underlying these causes are indications of:

- Non-professional maintenance, resulting in the occurrence and repetition of many simple, basic errors.
 - 2. Inadequate supervision, resulting in:

 a. Poor utilization of personnel evidenced by assignment of unqualified men to perform maintenance.

 Poor organization evidenced by absence of inspectors.

c. Failure to devote sufficient time, initiative and imagination to this problem evidenced by repeated occurrences of common, basic maintenance errors.

3. Insufficient command attention, resulting in apparent lack of motivation at the working level. This is evidenced by the many instances of errors caused by inattention. Failure to allow sufficient time for proper maintenance is a factor in this area; however, establishing a balance of operational time versus maintenance time is a command function determined largely by capabilities and cannot be adequately discussed within the scope of this study.

4. Lack of qualified personnel, resulting in errors due to ignorance and unfamiliarity. Although data presented in the study do not directly point to this area, any analysis of maintenance functions must necessarily include consideration of personnel assignment. The personnel requirements of aviation activities must be continually reviewed and revised as necessary to insure that sufficient manpower, in both numbers and skills, is assigned to provide quality maintenance. In addition, attention must be directed toward optimum utilization of trained personnel within individual activities.

Recommendations

Individual Responsibility and Motivation. The prevention of maintenance error depends primarily upon the state of mind of maintenance and supervisory personnel. In the maintenance and servicing of aircraft each man must take pride in his work and be personally responsible for its quality and completeness. Such a state of mind is closely associated with morale. Action to establish it is urgently needed and must be undertaken at command levels and at each level of maintenance supervision.

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Organization. Maintenance organization, when properly implemented in accordance with instructions by the Bureau of Naval Weapons and the major commands, provides optimum personnel utilization for quality maintenance. Each operating and maintenance activity must adapt the principles and techniques of quality control to suit its own particular requirements. The best qualified men must be utilized to establish an imaginative and aggressive organization and to insure its smooth functioning.

Personnel Assignment. Only the most highly qualified and motivated personnel should be assigned to the quality control division. The final inspection of aircraft maintenance cannot be adequately performed by unqualified personnel.

Command. Operating commands must insure that the maximum time and most favorable conditions possible, consistent with operational requirements, are made available for aircraft maintenance.

Specific Prevention. The study reveals the particular circumstances and conditions involved in 353 errors in maintenance and servicing. Each activity can make a significant step in the prevention of such errors by recognizing and eliminating similar conditions within its own organization. In this way, past experience will directly lead to improvement.

Ed's Note: Additional copies of MECH '61 may be obtained by dropping a line to Editor, APPROACH, U.S. Naval Aviation Safety Center, Norfolk 11, Va.

Those Sudden Changes May Not Be So Unexpected

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A good portion of our cockpit folklore consists of hairy tales wherein the weather is supposed to be severe VFR but whereas it actually turns out fence-high with viz to match. Salt-water recoveries as well as dry-land operations are involved. A few of these situations have even been documented. Notice how the following episode lends itself to a general indignation against the weather guessers when it is retold at Happy Hour or in the ready room.

0900 Aerology reports thin obscured, measured 600 broken, 2½ miles in haze and smoke, wind calm.

0909 Jet 101 calls for Tacan approach with GCA pickup for himself and wingman.

0914 102 commences approach.

0920 101 commences approach.

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0922 Aerology reports thin obscured, estimated 300 feet, 1 mile in fog and smoke.

0924 102 makes landing and tells GCA "I had to go a little past minimums to make it." GCA relays this message to 101 as: "The pilot ahead of you reports visibility ½ mile." Side number 101 replies: "I'm approximately low fuel state."

0926 Aerology reports thin obscured, estimated 200 feet, ½ mile in fog and smoke.

0928 101 waved off for going too far above glide slope.

open stope.

Aerology reports total obscuration, ½ mile in fog and smoke. GCA advises 101 that the field is below minimums (100 feet and ½ mile). 101 replies that his state is 800 pounds.

0938 (approx) 101 waved off by GCA for going too far above glide path. Pilot takes wave-off, catches sight of runway, lands long, drops hook, and engages arresting gear.

Fortunately, this is the usual ending of the story. If we call statistics to the aid of the weather serv-

ice we find that out of 69 aircraft accidents in fiscal 1961 in which weather was listed as a contributing factor, only three indicated that forecast weather was in error. These causes were: Headwinds stronger than predicted; Rain showers occurred earlier than predicted; Ceiling lower than forecast. Introducing these figures takes the weather people off the hook, so to speak, but the presumed number of near-accidents give no cause for complacency.

Three terminal weather situations require extra attention from ship or stations ops; (1) when the weather is going below VFR minimums, (2) when the weather is going below IFR minimums and, (3) when rapid weather changes are imminent. There is need for frequent observing and as each of these events actually occurs there is also a need for rapid reporting and dissemination of current weather. A delayed reaction somewhere in the "eternal triangle" of Tower—Weather Service—GCA, makes the pilot the big loser.

Regulations already exist which provide for cooperation between Tower-Weather-GCA. Tower controllers are obliged to call attention to actual differences between observed and reported weather and also to advise of impending changes which, because of their unexpectedness, may not be observed Immediately by the local weather observer. Local weather service is in turn, obliged to pass all Special and Record observations to GCA and the Tower.

Assuming that rapid dissemination of current weather is accomplished, is there anything else which might help pilots? How about some emphasis on a short range forecast or advisory to accompany the current weather? The trend of the terminal weather is as important as factual reporting of ceiling and visibility. The mail is sure to bring some crackling correspondence—if your local system is good, please give procedures and techniques which keep you that way.

Our product is Safety, our process is education, and our profit is measured in the preservation of lives and equipment and increased combat readiness.

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APPROACH The Naval Aviation Safety Review Published by U. S. Naval Aviation Safety Center RADM W. O. Burch, Jr. Commander, NASC

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Q: What is NATOPS?

- A: Naval Air Training and Operating Procedures Standardization program, established not only to reduce the aircraft accident rate through standardization of Navy-wide operational procedures based on professional knowledge and experience, but to improve combat capability and reliability.
- Q: How does it work?
- A: In 4 easy steps:
 - (1) Promulgation of NATOPS manuals by CNO for each aircraft model.
 - (2) Assignment of Standardization Coordinator and Evaluator billets at Aviation Command Headquarters, Replacement Air Groups and Marine Air Wings.
 - (3) Designation of Standardization Instructors by type commanders in all Navy and Marine aviation units, first in those operating combatant aircraft, then in noncombatant fleet activities, and finally at shore activities and overseas bases.
 - (4) Standardization checks not later than 60 days following receipt of NATOPS manuals.
- Q: What is a NATOPS standardization check?
- A: Check forms and examinations are contained in NATOPS manuals for specific aircraft models. The check, including a written examination, will cover both the air and ground environments.
- Q: Have any NATOPS manuals been published?
- A: Yes, 7 under CinCLantFlt cognizance, 9 under CinCPacFlt cognizance, and 4 under CNATra cognizance.

- Q: What does the manual contain besides check forms and examinations?
- A: Standard flight doctrine and optimum operating procedures for the aircraft model concerned, in eight chapters:
 - I Indoctrination (training syllabi and flying equipment requirements)
 - II Shore-based procedures
 - III Carrier-based procedures
 - IV Flight procedures
 - V Emergency procedures
 - VI Communications
 - VII Special mission
 - VIII Miscellaneous.
- Q: May I make suggestions?
- A: Yes. Send them to the Chief of Naval Operations

(Attention: OP-461E)

Washington 25, D. C. Suggestions on a specific model NATOPS manual should be sent to NATOPS Man-

manual should be sent to NATOPS Manual Coordinator, CinCLantFlt, CinCPac-Flt, or CNATra, depending on who produced the manual.

- Q: Shall I throw my flight manual away when I get my NATOPS manual?
- A: No. NATOPS manuals supplement flight manuals and NWP's. Before you had two, and now you have three.
- Q: Where can I get more information on NATOPS?
- A: Try these: (1) OpNav Inst. 3510.9
 - (2) APPROACH, June 1961, inside back cover
 - (3) APPROACH, Jan. 1962, page 48
 - (4) APPROACH, Mar. 1962, page 48.



LETTERS TO THE EDITOR



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Correct Minimums?

NAS, Meridian-The Jan '62 AP-PROACH, page one, last paragraph states "OpNav Inst 3720.2A further limits single-piloted aircraft to an absolute minimum of 200' and I mile visibility for an ILS or PAR."

We recently published our Air Ops Manual here and after much study and what I believe is an honest interpretation of 3720.2A, we feel that the 200' and 1 mile is a weather clearance minimum and not a landing minimum. (I don't agree that F8U drivers could come on in PAR at 100' and 1 but this seems to be the way the instruction is written.)

I feel personally that the instruction is worded poorly and that the intent is not really put across. Also, there may be some message addendum or correction that we don't have. In any case—what is the correct info? The article or the instructions?

> JAMES A. WHITE, LCDR Ass't Operations Officer



• The dope as stated in the article was correct—single piloted aircraft drivers are limited to an absolute minimum of 200' and 1 mile landing minimums.

You answered your own question when you stated that maybe there was a message addendum or correction to 3720.2A which you didn't hold. There is such an addendum. It was Change #2 to 3720.2A.

Under Section III (Clearance Procedures) refer to paragraph 2b. In the second sentence the words "field minimums" should be struck out and replaced by the words "minimums prescribed in paragraph 3a below." This makes the chart on page 5 the bible for clearance to takeoff and also specifies landing minimums.

Approach Plate Holder Again

VA-125-In the Jan '62 APPROACH Letters to the Editor a letter proposed an "interim solution" to the instrument approach plate holder problem. Well, out here on the "New Frontier" (NAS Lemoore),

VA-125 has come up with a design breakthrough on this problem. The VA-125 solution:

a. is ideal for use in all singlepiloted aircraft without modification.

b. is inexpensive and easy to make.

c. allows the entire plate to be readily viewed by the pilot. d. utilizes the existing Flight In-

formation Publication, Terminal

(High Altitude). The VA-125-devised holder consists of three medium-weight rubber bands and a paper clip. The rubber bands are looped together and the paper clip is attached to one end of the "chain." For use,

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

this assembly is removed from its convenient stowage in a shin pocket of the flight suit and, utilizing the paper clip to close the loop, strapped around the left leg. (It is presumed that the kneepad s being worn on the right leg.) The penetration pub is then opened to the appropriate page and slid under the rubber bands (See photo.) The plate is thus held securely on the pilot's leg and is readily apparent to his view.

R. K. AWTREY, CDR

Photos For Confidence

NAS Miramar-Request you send two copies each of photographs contained on pages 24 & 25 of Jan '62 APPROACH. If possible 8" x 10" size, glossy finish, black and white.

NAMTraDet #3008 Martin/Ba-ker Ejection Seat Trainer assigned to this area teaches Familiarization, and Class "C" Maintenance. At the present time we have no photographs or films of recent ejections. This trainer travels to

all of the Naval Air Stations in the western half of the U.S. and the WestPac Area. Pictures of this nature would be shown to aviators and to maintenance personnel concerned with ejection seats. They would be of great value to all concerned, especially in building personnel confidence in ejection systems.

Copies were not attainable locally due to the high cost of reproduction. In the interest of teaching good safety procedures, we urgently request you forward copies as soon as possible. If unable to fill this request, please advise us as to the proper procedure for obtaining these particular photo-

A. S. KALAS, JR., LCDR Naval Air Mobile Training Group

• Pictures are on the way.

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Randolph AFB, Texas-Your Feb '62 Letters to the Editor contained an error which I hope you will correct in the next issue. Captain James W. Faircloth's letter on Gooney Bird Navigation was credited as being from the Interceptor. It was actually from The Naviga-

tor, May '61 issue.

Three hundred copies of The Navigator are regularly distributed to the Navy. Would you, therefore, run the attached "SOS to Navigators" in your next issue?

E. B. EDMONDSON, JR., Maj., USAF Editor, THE NAVIGATOR

Chip Detector Info Request

VP-23, Brunswick, Maine—I believe one of the fall 1958 issues of APPROACH carried an article concerning chip detectors. I would greatly appreciate a copy of that article and any other information you have concerning the capabilities and limitations of chip detectors.

WRIGHT "A" BRUNSON, JR., LT

• You will find the article on page 45 of the Nov '58 APPROACH. There are also a couple of others in the Oct '61 issue (page 42) and on page five of the R3350 engine

Aircraft Service Change 861A calls for retrofit of the light in the P2V. AirPac has made this urgent

SOS to Navigators

The Navigator is an Air Force magazine with the primary purpose of keeping professional navigators better informed on matters of technical and general interest to them.

The Chief of Naval Operations welcomes contributions to Navigator by personnel of the United States Navy. Joint participation in the fields of mutual professional interest is an excellent idea, and certainly there are Navy navigators with tales worth telling.

Naval contributions should be approved by your Type Commander and submitted through:

CDR F. H. Markey. OP-561F3 Navy Department Washington 25, D. C.

and AirLant has provided O&R field teams to make this installation. It is our understanding from BuWeps readiness here that your squadron has been serviced and that only VP-11 remains and that it is in the process now.

Quizzer's Quiz

NAS Olathe, Kansas-I miss your very worthwhile question & answer quizzes that have been published in your fine magazine in the past.

Below is a brain twister pertaining to CAR 60 that I ran across and am sure that it will cause a few Air Traffic Specialists to ponder over the correct answer.

An airframe supported by a mechanically driven airfoil rotated about an approximately vertical axis is impinging upon that airspace specifically reserved for the orbital maneuvering of various aircraft in an approximately elliptical pattern for the purpose of ascending from, and/or descending to a nearly horizontal prepared surface on the earth's crust. Various impedimenta to ocular efficiency, usually associated with colodial suspension of H₂O, the presence of condensation nuclei being an integral part, are so compressed that density is such that specified objects of known dimensions and color cannot be readily distinguished at a horizontal linear distance in excess of 2.4 kilometers. Which of the following actions would be considered expeditious and proper?

a. Solicitate the pragmatic sanction of a competent authority.

b. Abide by previously promulgated directives peculiar to this type of airframe. c. Clearance not required if op-

erating below 700 feet.

d. None of the above. Keep up the good work.

G. H. ZAMOYTA, ACC NATTU, GCA School P.S. Answer: A.

Signal Gear Praise

HMR(L) 262-While en route to home field in our chopper recently, I noticed a small column of orange smoke drifting through the trees ahead of us. I had no sooner finished commenting to the other pilot about the smoke when a beam of reflected light flicked through our cockpit. Spotting two people in orange flightsuits at the light source, I commenced an approach to the dirt road occupied by the signalmen. Only then did I see the helicopter, apparently undamaged, resting in a cleared area 300 feet from the road. We passed word of their engine failure and assistance was begun immediately.

If the downed crew hadn't used their signaling devices, we would have flown directly over the scene at 500 feet and in all probability would never have noticed their

presence.

EUGENE L. OSMONDSON, LT

Minor Typo

Los Angeles, Calif .- Just a note on a minor typographical error in

the Jan '62 APPROACH.
Page 20 "Answers to Whiz
Quiz," question #2. Answer should Quiz," question #2. Allower aread, "descend as rapidly as possible to 1000 feet above the assigned altitude/flight level."

W. E. LARNED (RADM, USNR) Manager of Flight Operations United Air Lines



It has been my privilege to serve with and for the officers and men of Primary Training for the past two years as Aviation Safety Officer. I have unsuccessfully resisted the opportunity to express a few last words of advice . . . based on 2½ years personal experience and the records of 4½ years of Primary training in the T-34B. These words concern the two factors which constitute the major threats to safe flight in VT-1.

Instructor Boredom

A case in point: An instructor and a precision (B) stage student were practicing crosswind landings. The student was having difficulty with the wing down, top rudder correction. On the student's third approach with the right wing low and no opposite rudder, the instructor grabbed the stick, slapped the aircraft into a left wing down position and dragged the port wing on the runway. The instructor was a first tour (plowback) pilot with 850 back seat instruction hours in the T-34B. The problem: We often use other descriptive words when talking about the condition called boredom; inattention, carelessness, laxity, complacency. But these terms denote only symptoms and not the cause. Seldom if ever does the instructor meet that hairy situation which he is preparing the student for by training and repetition. These are the ingredients that create boredom and

breed complacency. A different side of the same coin is the instructor who habitually lets his students carry maneuvers to an extreme before he takes control. In his own mind he has a commendable goal in wanting to make sure that the student sees and realizes the seriousness of his error. This method of instructing is closely akin to target fascination.

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Complacency is born not only of boredom or overzealousness, but also from lack of respect for the aircraft and the inexperience of the front seat pilot. When the new instructor begins to teach he has this respect (largely as a memory from his own Primary flying). Time and the uneventful tempo of operations dulls this memory. Thus at various times the attitude crops up in some pilots that "nothing can go wrong in this baby buggy." Not true! Nothing needs to go wrong; the T-34 and our methods of operation are essentially safe. Only failure to constantly expect the unexpected ... at any point, from preflight to shutdown, can and has resulted in catastrophe.

Remedies attempted: Instructor boredom has been directly attacked on four fronts (besides these, there is in existence another entire program aimed at increasing motivation by keeping the officer current in career developments and in national and world affairs.)

(1) All instructor pilot factor accidents and selected solo accidents are reviewed with all incom-

From: VT-1 Aviation Safety Officer

To: My Relief

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A LAST WORD

by LCDR R.W. KENNEDY



ing instructors. Danger areas and techniques for avoiding them are presented during standardization training. The necessity for maintaining peak vigilance whenever airborne is repeatedly emphasized by everyone from the C.O. on down.

(2) A close watch is maintained on all instructors for signs of excessive or chronic fatigue or irritability. Depending on his length of time in the back seat, an individual is encouraged to take leave or transfer to a proficiency billet. There are sufficient administrative or academic teaching jobs that most officers can switch after one and one-half to two years. This rotation is also recomfineded to broaden the junior officer's career.

(3) Sometimes instructors break the rules—either unintentionally, through inattention or deliberately. Unless the violation is unusually serious or flagrant, a friendly and informal talk by the ASO or Flight Leader puts the pilot back on the beam. Instructors take great pride in their proficiency. Making an issue of minor errors definitely has an adverse effect on performance and morale. Of a total of 350 instructor pilots who have served in this command in the past two years, only three have been referred to a department head or higher authority for more stringent action.

(4) We have long recognized that fatigue plays an important role in the instructor's attitude and vigilance. The dividing line between doing a job well with a margin of safety—and having to rush

with all the detrimental effects of hurry—is the line between three and four flights per day. Every effort is made to restrict instructional flights to three per day.

Student Ignorance

A case in point: A solo student in a steady state, power-on descent checked his engine instruments (for the first time since becoming airborne) and noted his cylinder head temperature pegged at 300°C. All other gages were reading normal. He declared an emergency and set up an approach to a farmer's field using descent power only, since he was afraid more power would damage the engine. He arrived at high key at a lower than usual altitude and during the tight turn to landing forgot to lower the gear.

The Problem: Ignorance is a harsh word, but simply defined it is the condition of not being informed. This is an extremely unhealthy state when applied to solo flight especially when the object of it is an aircraft or the employment thereof. There are vast deficits between theoretical knowledge (of engine, aerodynamics, etc.) and practical application. There is also a tremendous amount of new material which a student must assimilate in a short time; course rules, emergency procedures, maneuver descriptions, lookout doctrine and the like. Our experience has been that the average



The "Word" for the primary student is contained in these publications. It must be consistent and coordinated with flight phase instruction.

flight student just does not digest it all. Most important, he lacks perspective—or the experience to differentiate between what is nice to know, what is important and what is vital. Accidents in this category occur when a student with the requisite ignorance is placed in a situation where he needs the information. In this command no effort receives greater attention than providing the fledgeling aviator with the wherewithal to safely operate his aircraft.

Remedial Action: The most important course of action is to select and emphasize the vital life and property saving knowledge. The key to this program is coordination. Items of paramount importance have been distilled from accidents and experience. Liaison with ground school and flight support lecturers is maintained to ensure that this information is stressed in their classes. A system of regular twice-a-day briefings for students at their flight area musters is in effect. Flip pad briefing guides have been devised to aid in standardized presentations. Displays and posters also reflect these points. Instructors are acquainted with them and encouraged to bring them out in their own briefings and on dual flights. The goal is to get inside every student pilot's brain and plant the hot, straight word. However, even the most efficient word-passing system has a built-in limitation. The best words composed on this limitation, as it applies to training student aviators are those of an ex-skipper of Saufley Field:

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"I am convinced that we are offering the best flight instruction available anywhere in the world. Even the substandard students, which are practically all I ever see, have obviously had first class, professional instruction. I am rejecting any notion of a mass shakeup of our teaching practices. Of course we will continue to improve, but our present system, evolved from years of experience is sound and is executed by a dedicated group of instructors. Our students are good. Sitting up in the 'Ad' Building, I only see the worst of them. All of us, I am afraid, are blinded to the excellence of the vast majority by the failings of the few. One spectacular crash makes a bigger impression than 10,000 hours of hard, professional student performance.

"Where then have we goofed? Why do we have those silly crashes? In answer I have only one suggestion. We have tried to assume the student's responsibility. We are trying to do the learning for him. We have tried to establish a hot house environment where the student is bathed in aeronautic know-how until he is completely standardized. Then we gently pin on a pair of wings and send him off to the fleet in the hope that he will draw a squadron commander who will wet nurse

him through his obligated service.

"These students of ours deserve a better break. They arrive in Pensacola with visions of becoming an Eddie Rickenbacker and Joe Foss combined with a little Buz Sawyer. They are tigers. Then they find Saufley is the place with a procedure for everything. To them a High Altitude Emergency (HAE) is not the method of getting down safely in an emergency. It's a catechism of check-off lists and transitions.

"Quoting two typical examples in T-34's—the first lost his CHT gage. His not to reason why; he went into his HAE routine and, forgetting only his wheels, belly flopped into a farmer's field. The other thought he had a propeller failure—he is very hazy as to why he so thought. Neither did he reason why—HAE procedures—belly flopped into a farmer's field. Our basic teaching should be: It's a pilot's responsibility to do everything in his power to get himself and his airplane, if practicable, down in one piece. In too many cases we say in effect, 'In any situation follow your procedures. We have one for every case.' After a couple of months the student aviator comes to re-



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VT-1 and Saufley ASOs share the same office and work out their common problems on a daily basis.



The weekly safety meeting ponders ways and means of staying out from behind the accident "8" Ball.

gard himself as an IBM machine. We punch the buttons and he is supposed to produce from his memory cells the right answer. His only responsibility is to be able to regurgitate what he has been spoon fed.

My solution to the problem is not radical. No syllabus change is proposed. But it is proposed that we tell the student frankly that the learning process is his responsibility. One syllabus pretty well covers the required ground. In VT-1, the student should become a competent T-34 driver. He should be able to handle any emergency professionally. We will at least teach him a solution to several emergency situations. We are here to teach, demonstrate, encourage and correct. The student is here to learn. If he cannot or will not, we will get rid of him—with no tears.

While these two major problem areas receive a great deal of attention there are others that must receive their share of emphasis. Many routine procedures have been developed over the years to ferret out and control threats to safe operation. Since VT-1 is a large organization (over 400 students and 150 instructors), two committees, both meeting weekly, are used to detect errors and hazards, devise solutions and get out the word. The Safety Officer's meeting is attended by all flight unit ASOs, the Maintenance and Squadron Safety Officers and representatives from the tower and crash crew. Matters of both large and small import are discussed and either answered on the spot, deferred for investigation or referred to the proper department for action. Notes of each meeting are published, posted and reviewed at musters and APMs.

The Training meeting is attended by the Training, Operations, Standardization and Safety Officers as well as all Flight (unit) Leaders. Safety problems are a major portion of the agenda. Effective morale recommendations often come from this group.

It seems that we have pinned the tail on the accident donkey in the same old spot—right between the pilot's . . . ears. Yes, 'tis sad but true. The facts are there; plain for all to see who will: Pilot factor has been established in 83% . . . versus the all-Navy figure of about 55% for the same period. Small wonder then, that pilot attitude, pilot technique and pilot knowledge receive the major emphasis in VT-1's accident prevention campaign.

I only wish that I could report that all the measures outlined in this summary have eliminated accidents in Primary . . . but they haven't. Some trends have been reversed and the rate as a whole has declined but the major problems are still with us

My relief still has that accident-free year to shoot for!

Tuesday morning I launched in an F3H for a routine CAP and was under control of the ship for the entire flight. About half way through the period I rendezvoused with an A4D tanker and took on 1800 pounds of fuel.

My Expected Approach Time (EAT) was good and the carrier came into sight but my first pass at the deck was waved off and a few minutes later I was told to climb, dog and conserve: An A4D was in the catwalk and there would be a ten-minute de-

lay.

After orbiting for about ten minutes the deck was still foul and I rendezvoused with another tanker. There was difficulty at first because the drogue did not retract when my probe entered the basket. However, the tanker cycled his drogue and I was able to plug in after 10 to 15 minutes.

With the tanker in business I was able to stay in business—without it I would probably have gotten to use my water survival gear. Why: It took approximately 25 minutes to clear the deck after the A4D went into the catwalk.

Now, on the following morning, I launched with a wingman for another CAP. Our two aircraft were under separate control but we both made our EAT of 0730. Weather was given as 1500 broken to overcast with 6 miles visibility.

When I arrived at the ramp it was foul with four F8U's, two F3H's and one WF all using it for parking. My state was 3900 pounds at the time my wingman and I pulled up to orbit the ship, VFR on top at 5000 feet.

After some 10 or 15 minutes, we were cleared to let down in trail ahead of the ship and turn downwind for final. About this time the ship moved into a fog bank and the weather zilched to deck level with zero visibility.

On my first two approaches, CCA was not controlling the traffic pattern since, as I found

TANK YOU, ANYMOUSE



later, they still thought it was VFR. In all I made four attempts to get aboard but was unable to see anything. At one time there were four aircraft between the 180 and the groove.

Around my third waveoff, tankers were brought down around the ship. Following my fourth waveoff, they were in position for myself and wingman to rendezvous with them. At the time I plugged in there was only 800 to 1000 pounds left in the tanks and my wingman was in no better shape. Each of us received 3000 pounds and were bingoed. Again, thank Heaven for the tankers.

The events of these two successive days are not particularly out of the ordinary in carrier ops, but you can see the margin between a "hairy tale" and an ejection.

Things, that to my mind need some consideration, are: (1) that pilots be assured of a ready deck prior to leaving the Marshall Point, (2) that CCA be kept up to date on weather conditions, (3) that steps be taken to expedite clearing the flight deck after an accident. If it takes 25 minutes to clear an A4D out of the catwalk how long would it take for an A3D. It is a point of pride for the crash people to salvage an aircraft without inflicting additional damage but there are times when somebody has got to issue a priority—careful salvage or a clear deck.

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Since we are becoming more dependent on the tankers, we should, if possible, have two tankers airborne during all recoveries: In case multi-plane refueling becomes necessary and in case one of the tankers should malfunction.

My experience has led me to believe that it is just as easy to refuel (both day and night) with the tanker in a turn as it is with wings level. This keeps the operation within 10 to 15 miles of the ship.

A Night Full

Although not exactly a seasoned pro after only two night cat shots in the A4D, I was looking forward to the third shot with a certain degree of confidence. After all, everything was going as I knew it was supposed to go. Little did I realize though, that the hairiest five seconds of my life were about to occur.

Everything seemed fine as I slammed forward, crossed the bow and began to rotate. I suddently became aware that something was wrong with the instrument panel and also realized that my aircraft was in a horrendous overrotation due to the stick being forced back into my lap—and it was locked there, I couldn't

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With my nose pointing higher and higher and my airspeed diminishing, I was gaining altitude but I couldn't prove how much since it was a "malfunction" of the altimeter that was the cause of my predicament. It had fallen three-quarters of the way out of the console and was iammed in between stick and console. Next time you are sightseeing in the electronics shop, take a look at this little monster in all its naked beauty and you will see how long three-quarters of the way can be.

Although I couldn't remember much in the handbook about this particular emergency situation, I figured the best bet was to definitely retrieve that lost altimeter and put it where it belonged. In order to do this I removed my left hand from the throttle and felt a slight sinking feeling as I noted the throttle immediately began to creep back-Friction lock knob, where art thou?! As I sensed the little Tinkertoy beginning to shudder in a style reminiscent of a stall, I jammed the throttle forward quickly and wondered how long it would take to grow a third arm with which to reach and pull the face curtain.

This did not appear to be a very likely solution so I made a hurried sweep with my left hand and managed to dislodge the altimeter enough to allow the stick to be forced forward. The nose kicked over and I made a successful, if somewhat dipping recovery that carried me a trifle closer to the water than I generally like to be.

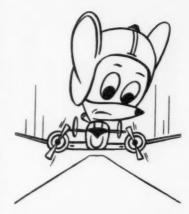
With my rather unorthodox rotation, Pri-Fly did reveal some concern by asking "Anything wrong?" I was sure they really wouldn't understand so I spared them the details until I landed

back aboard.

After all squadron pilots were interviewed to determine if this was an isolated case, six pilots reported similar incidents on cat shots (instruments included an EPI, ASN-19 bearing indicator, clock, compass, altimeter and airspeed indicator). There were 13 other instances over the past several months when various instruments came loose or out during all phases of flight.

GAD! Please tell us what church you attend regularly, Dad? Maintenance, please take note!—Ed.





Foot Trouble

On takeoff from an 8000-foot Air Force runway, both engines on the SNB sputtered and lost power about 50 to 75 feet off the deck. The gear was coming up. A quick scan of instruments, controls, . . . did not show why no power. As we started down I slapped the gear handle down.

Just a second before we were back on the runway the gear locked down and with the assistance of a good headwind and that 8000-foot runway we had the speed under control before going into the river at the end. There was enough momentum to coast off on a taxiway. After clearing the runway we took a check of everything—and found the trouble.

The fuel selector was on the number 2 tank and evidently my trouser leg caught the tip of the selector while I was twisting around to retrieve a pencil I dropped just before takeoff. Anyway, the selector was out of its detent. The engines got enough fuel for takeoff but not enough for prolonged operation.

It is my habit to run up to 30 inches for 10 or 15 seconds before releasing brakes to check instruments, engine sound, fuel selector, . . ., but this time I overlooked the fuel selector since it had been properly positioned before.

Have a problem, or a question?

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he'll do his best to help.

Hooded Instrument Flight

Dear Headmouse:

We have been searching the literature to find some information on hooded instrument flight. There was a message from CNO a few years ago, but we could find nothing of an instruction, etc. I think that a message is a fine way to get the word out in a hurry. But, what about the people who aren't there at the time? Cecil Field, CVG-4, VA-44 and ComFairJax were consulted and nothing could be found. If you have any information about the subject would you please forward it to me.

L. G. BRAMLEY, ASO NAS Cecil Field

CNO's message 261520Z of April 1960 stated that hooded instrument flight was permissible if certain conditions were met. These stipulated conditions included the following, pertaining to single-piloted hooded instrument flight.

This is OpNav Note 3710: "Cancel my 252130Z May 58. In order to provide realistic flight training and improve pilot instrument capability in combat models, use of hoods in VFR flight conditions in single-place aircraft is authorized provided:

a. Chase plane is utilized.
b. Instructions of OpNav Inst
3721.1C of 8 Dec 59 are followed
plus requirement for two-way
radio transmissions between
hooded and chase aircraft every
three (3) minutes when above
flight level 240 and every one

(1) minute below flight level 240 when outside RATCC/ASR/GCA control areas. Chase pilot initiate communications check.

c. Only approved approaches at military installations under positive control are used during hooded training in VFR conditions.

d. High density areas and civil jet radar advisory routes are avoided.

e. Hoods permit rapid transition from instrument to visual flight. Military positive radar control in terminal areas, TACAN, airborne radar and IFF should be utilized to the maximum. Air reservations preferably during non-peak operating periods, should be used where available.

After initial takeoff, pilot may not go hooded before reaching 2,000 feet. This in no way relieves responsibility of flight to maintain vigilance to observe and avoid other air traffic. The contents of the message remain in effect until detailed instructions are promulgated in appropriate OpNay Instructions."

In searching the directives, no OpNav Instruction could be found pertaining to hooded instrument flight, nor, for that matter could an AirLant Instruction be found on the subject. Therefore it appears that hooded instrument flight is authorized using CNO message 261520Z of April 1960 as a guideline.

We are forced to agree with you that messages which tend to be directive in content should be backed up by a more permanent type instruction, particularly for those people, who as you say, "are not there at the time."

Very resp'y,

Headmouse

Knife Position

Dear Headmouse,

The article "Point of Survival" in the November issue of APPROACH has raised a few questions among our USAF pilots. Which of the three locations for carrying the survival knife-torso harness, calf, or back side or lower suit legis the best place for knife retention during ejection, parachute deployment and landing? Secondly, have there been any cases in which the pilot was cut or stabbed by his own knife during ejection? Could you furnish sketches or photographs of the various methods of carrying sheath knives in use by the Navy? Are there Navy Technical Orders covering local modification of flight suits or parachute harnesses for carrying sheath knives?

GEORGE F. MCCARTY 1st Lt, USAF Personal Equipment Officer 509th Fighter Interceptor Sqdn

►Your letter concerning the best location for the survival sheath knife raises questions for which the Navy is unable to furnish all-encompassing answers.

So many variables enter the picture that a simple statement on the subject is impossible. This problem was discussed in some detail in an answer to a similar inquiry to Headmouse in the Dec. '60 APPROACH.

As for instances in which pilots and crewmen have been cut or stabbed by their knives in ejection and bailouts, in one or two cases the knife handle has been suspected in contusions and gouge-type leg injuries. If memory serves, there has also been a case in which the handle of a knife worn incorrectly on the life vest, was suspected of chipping one of the pilot's front teeth. However, when considered in relation to the large number of cases in which the knife has saved the life of a Navy pilot or crewman, the hazard of such possible injury becomes of minimal importance.

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Personal Equipment Crossfeed shows one squadron's method of wearing the knife on the torso harness. Other pilots prefer to attach it to the upper arm, thigh or lower leg. There are no Navy Tech Orders covering local modifications of flight suits or parachute harnesses for carrying the sheath knife. It is

a matter of personal preference at the moment.

Headman

Equipment Query

Dear Headmouse,

With water all around us and runways that go to the States and Europe, we in survival try to give the flight crews the best in personal

survival equipment.

Yet they kick it around, don't hang up their life vests, and take flashlights and whistles and even the CO2 cylinders. Parachutes in a P5M are a thing of the past—the crews say they can land on water faster than a man can put on a parachute. Parachutes are also moved from one aircraft to another which makes it hard to keep up with the packing overdue

I've asked the flight surgeon for help; I've talked safety; I've put out signs, posters and pictures of equipment that was used to save a life. Headmouse, what do you think is the answer?

RIGGER MOUSE

►Wish I could say your problem is an isolated case but from time to time other riggers have commented on some pilot's and crewman's thoughtless abuse and misuse of personal survival equipment.

Smart pilots and crewmen realize that anything they do which damages or renders personal survival gear ineffective is a crime against themselves and their shipmates. It is their lives which will be forfeited if the gear fails or is missing in an emergency.

The plane commander is responsible for the equipment in the aircraft as well as the aircraft itself. A PC who takes off with poor survival equipment is as guilty as the one who takes off without a proper preflight. The only answer is for command to continue the education and training program. No really "squared away" squadron has a sloppy attitude toward safety and survival equipment.

Though sometimes a rigger's job may be frustrating, especially when you see the very persons you are trying to help hurting themselves, keep up the good work.

Headman

EARLY REPORT ON PROJECT SCAN

Flight Safety Foundation reports that the airspace from 7000 to 9000 feet over the Omni is an excellent spot to have a near-collision-if you go in for that sort of thing. This is one of the more significant of the early returns from Project SCAN, the foundation's program to collect and analyze data from near-collisions.

Reason for the hazardous area over the high cone is the popularity of the 7000 to 9000 foot altitude among pilots of unpressurized aircraft plus increased

use of omni navigation equipment in general aviation aircraft.

It's still too early to define specific causes for near-collision incidents; however, probable areas of concern in addition to the VOR sites are as follows:

1. Traffic Patterns-Especially true at small or medium-sized airports, or where the local pattern is non-standard.

2. Conspicuity-Certain color schemes which look attractive on the ground actually camouflage the aircraft in the air.

3. Radar-Definitely not a cure-all at this time. In addition, present procedures do not require, nor does manpower permit, 100 per cent coverage in both IFR and VFR weather.

4. Pilots on IFR clearances believing they have a reserved block of airspace.

There is no reason to believe that the ancient principle of "see and be seen" will be discarded in the foreseeable future. Too many aircraft which have a right to use the airspace must operate under this principle.-The X Wind

compare your last trip to...

Country ross

From LEARNING TO FLY IN THE U.S. ARMY by E. N. Fales. Copyright, 1917. McGraw-Hill Book Co., Inc. Used by permission.

Pross-country flying differs from ordinary airdrome flying in that it takes you a long way off from your landing field. In cross-country flying your chief anxiety will be to arrive at your destination and to be constantly searching out available landing fields in case of engine failure. Further experience in cross-country work will involve more and more difficult trips, until you will think nothing of flying, for example, on long raiding tours over unfamiliar enemy country.

Knowing that you may have to land far away from any headquarters, you must take a complete set of tools and covers for the airplane. Your clothing need not be different from usual, and will comprise helmet, goggles, leather suit and gloves. Do not forget your handkerchief, which you will frequently need to clean off your goggles.

Following are some of the instruments needed on a cross-country trip. A compass, which should be properly adjusted before starting; wrist watch is necessary since ordinary dashboard clocks go wrong on account of the vibration; take an aneroid barometer with adjustable height reading and of course, you will depend upon a revolution indicator, for no matter how experienced a pilot may be in "listening out" faulty engine operation, after a long flight his ear loses its acuteness and he will fall back on the revolution indicator for assistance. The airspeed meter, whether of the pitot or pressure-plate type, will prove invaluable in flying through clouds or mist when the ground is obscured. Also the inclinometer is able to give the angle of flight when the earth is not visible, although the speed indicator usually is sufficient to give the angle of flight. An increase of speed means downward motion and a decrease of speed means upward motion. Additional instruments may be used.

The map is essential for cross-country work. The scale may be 2 or 4 miles to the inch for long flights. As landmarks, towns are the best guides,



and they should be underscored on the map or enclosed in circles. It is customary not to fly actually over towns. Railways are very good assistance in finding your way. On windy days when relying on the compass, it will be well to keep in sight of a railway even if this be the longer way around, because the railway gives a constant check upon the compass bearing. Railways sometimes seem to end abruptly, which means that you are looking at a

The use of roads as guides may be governed by the fact that paved roads are usually main roads. and telegraph wires may be expected along them.

It is important to note the time of completing successive stages of the flight, that is when passing over predetermined landmarks. Time is a very uncertain condition to ascertain in airplane flying for it seems to pass quickly on calm days but slowly when the journey is rough. If the pilot does not check the time interval between successive objects he is quite likely to expect the next before it is really due.

Next to the ever-present worry which the pilot has regarding the perfect operation of his engine, the most important thing about cross-country flying is that wherever he may be he must have available a landing field within gliding distance in case his

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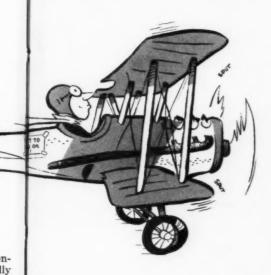
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Flying — 1917



his engine defaults. If there are no fields, it is up to him to pick out a spot of ground which is the least objectionable for a landing.

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On the London-Edinburgh route landing grounds are so frequent that by flying at a height of a couple of miles the pilot can free his mind completely of the worry of suitable landing places; but in the United States we have very few established airdromes. That is why long cross-country trips are such an adventure in this country and such an ordinary affair in England.

In case you have choice between several possibilities, choose a field near a town if possible. Remember that a field which appears to be near a town from the air may actually turn out to be a long walk after you have landed and find that there are various trips to be made to and fro between your chosen landing spot and the town, for the purpose of securing ropes, gasoline, supplies, etc.

Avoid river valleys for landing overnight, as there is liable to be fog in the morning.

Any field which has been previously used for landing with success by an army officer can be wisely chosen. Regarding the size of fields, it can be said that while the JN-4 machine will rise off the ground after a run of 100 yards or so, a field of this length is of course not big enough for frequent use, especially if bordered by trees, telegraph lines, fences and so forth. A field for temporary use should be at least 200 by 200 yards or about 9 acres. For a permanent field 300 yards is the minimum dimension for clearing obstacles and must be increased if the trees exceed 50 feet in height. Training fields are ½ mile square or more.

Some airdromes have pot holes in them, and these holes should be marked in each case with a large high red or yellow flag. Do not use short, small flags, as they will frequently be invisible to pilots taxiing on the ground. All telephone wires, etc., should have large blankets or other suitable signals hung over them to warn the pilot away.

In landing for the night do not stay up until it gets dark but choose a landing place which will allow you to come down one hour before dark; this amount of time will be needed for laying up the machine over night. Dismount from your machine, lift up the tail enough to leave the wings edgewise to the wind, the machine, of course, facing the wind and jack up the tail in this position by the use of any convenient prop. Lash the control wheel or joy stick fast in a fixed position so that the wind cannot flap the control surfaces around and damage them. Put chocks under the wheels. Peg down the wings and the tail to stakes driven into the ground using rope if you can get some or lacking this in an emergency fence wires which you can secure by means of your wire cutters. Do not lash tightly enough to induce strains in the framework of the machine.

Next, fill up the tanks if a supply of gasoline or oil is available. Put the covers on the propellers, engine, cowls, etc., in order that rain and dew shall do no damage to these parts. The wings and body are varnished waterproof and will not be seriously damaged by a little moisture.

Of course, you will engage a guard to watch the machine all night; see that a rope is strung around the airplane to keep off the crowd which may collect.



Of every ten parachute descents in Naval Aviation, four can be expected to terminate in the A

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Add to this the ditchings and water crashes and it is easily seen that rescue at sea is a thriving

Open sea rescue by helicopter was accomplished 93 times during fiscal year 1961. This figure represents rescue of the survivors of 64 aviation accidents. During this period there were two unsuccessful rescue attempts which resulted in fatalities.

The need for rescue is born of mishap. It follows that the general character of the emergency escape problem will definitely affect the rescue operation. Since this article deals with open sea rescue, it therefore follows that it deals almost exclusively with carrier based aircraft, both fixed and rotary

wing type.

Most of the accidents occur in the landing, takeoff or hovering phase of flight. Correspondingly,
most rescues take place at a distance of 5 miles or
less from the ship. It took less than 5 minutes
from mishap to pickup in 43 of the recoveries.
Table 1 indicates the time and distance factors in
the rescue operation. Noticeably absent are the
long range helicopter rescues; however, a change
from the present quasi-peacetime operations could
easily change this. Significant also is the fact that
in 60 recoveries no search was required to locate
the survivors. The greatest elapsed time from
mishap to rescue was 2 hours 29 minutes. This was
a night ditching, requiring search, and the survivor
was rescued during the early light.

In discussing the problems confronting the victim of an aviation mishap requiring a rescue at sea, the sequence of events after the mishap can be divided into egress, survival and rescue phases.

Egress Phase

The problem of escaping from non-ejection seat equipped aircraft and helicopters hasn't changed much over the years. It is still complicated by bailout difficulties and the hazards in rapidly evacuating a ditched aircraft through small exits and with parachute and survival kit attached.

However, there has been a definite change in the pattern of ejection seat usage. The unsatisfactory ditching characteristics of the high performance aircraft have brought into being the low altitude escape systems. This increased escape capability has saved numerous lives. However, it has also complicated the survival phase to some degree. The necessity for and accomplishment of a low altitude ejection develops rapidly. The elapsed time from seat firing until water entry can be as short as 5 seconds. The rapidity of these events and the shock of the ejection leave the pilot poorly prepared for the survival effort that follows immediately and in an environment which is always hostile.

Survival Phase

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The first step in the water survival phase is to keep from drowning. For this reason airmen are provided with personal flotation devices and rafts. However, the problem isn't solved simply by inflating this equipment. In all but the integrated parachute harness system, the harness must be shed before the life vest can be inflated. Even with the integrated system, where the life vest can be inflated at water entry, failure to get rid of the parachute canopy can easily result in a "water drag" or entanglement in the shroud lines and canopy. For the person parachuting into the water the chances are one out of four that he will have difficulty in divesting himself of the parachute.

The inability of the pilot to get rid of the parachute before he becomes entangled or is dragged under represents the greatest hindrance to survival and subsequent rescue. To emphasize these problems, here is the statement of a pilot who ejected immediately after a catapult launch:

"Ejection was normal. I remember tumbling in the air and seeing the flaming aircraft moving away from me. Knowing the altitude of ejection was no more than 200 feet I was getting very anxious for the parachute to open. Finally, it gave a definite tug, and I hit the water. The partial deployment caused my feet to come together and strike the water first. This I believe saved me from more serious injuries. Upon realizing I was under water, I immediately found the lanyards for the CO, cartridges and inflated the mae west. When I surfaced I was unable to breathe because of the oxygen mask. Removal of the mask was no problem then. The mask probably saved me from getting both a nose and mouth full of water on impact.

Time/Distance Relationship for Helicopter Rescues

Period 7-1-60 to 6-30-61

	Distance										
Time	0-5 mi.	6-20 mi.	21-50 mi.	Over 50 mi							
Over 2 hours			1								
1 to 2 hours	5										
31 to 60 min.		1	3	1							
16 to 30 min.	3	5	8								
11 to 15 min.	8	2	4								
6 to 10 min.	8	2									
1 to 5 min.	43										
TOTALS	67	10	15	1							

TIME is reckoned from mishap to actual rescue.

DISTANCE is measured from geographical position of the helo when it departs for the rescue to the site of the rescue.

Continued

"I was still attached to the parachute but this became secondary for just a few seconds, when I realized I was coughing up blood and it was very difficult to breathe. The rescue helicopter at that time dropped a corpsman to help me out, and I relaxed somewhat trying not to aggravate the cough and breathing.

"After pausing for those few seconds, I began helping the corpsman with my parachute. I undid the leg straps and then the survival pack attached to the mae west, also the oxygen hose, mike cords and bailout bottle hose. I let the corpsman drag me to the rescue hook on the helicopter because my left leg and chest were beginning to become rather painful. Getting on the rescue hook was no problem and very soon I was being hoisted toward the helicopter. Just before reaching the helicopter I began to spin-sway. This caused some concern, but my helmet took the glancing blow as I was hoisted aboard. After the door of the helicopter was secured, I eased out of the hook and lay down on the floor of the helicopter."

Many times the problem of releasing the parachute was not described in detail by the survivor; he just "had trouble" getting out of the harness or releasing the canopy. Often, because he was being dragged through the water, the pilot couldn't operate the release devices. Cold or injured hands, slippery gloves, confusion or anxiety, pain from bodily injury and salt water ingestion while being dragged delayed or prevented the pilot from ridding himself of the parachute.

Once free of the parachute and buoyed by his life vest, the survivor can give his attention and energy to the tasks of protecting himself from the elements and making his location known to the searchers. Fortunately in 60 rescues during fiscal year 1961 no search, as such, was needed to find the victim. However, the devices mentioned as responsible for gaining or maintaining visual contact are listed in the order of frequency of reporting:

Distress Signal, Mk13
High visibility marking on helmet or flight suit
Dye marker
Flashlight
Tracer ammunition
Mirror



After the egress and survival phases the aviator is ready for the helicopter recovery. Fortunately, the time from mishap to recovery was frequently less than 10 minutes. For the helicopter pick-up, the rescue seat and sling were used almost an equal number of times. During the recovery the airman who retains his protective helmet is most wise, for it has protected more than one person from head injury during hoisting and helicopter entry.

A listing of the injuries of survivors rescued by helicopter in fiscal 61 shows that 35 were uninjured, 43 had minor hurts, 13 received serious injuries, 1 critical and 1 fatal.

The critically injured victim was recovered using the seat but he reported difficulty hanging on to it because of his burned hands. The remaining survivors, excepting the low altitude ejection previously discussed, mounted the seat or entered the sling without the aid of a rescue crewman, although one pilot said he couldn't have held on to the seat much longer.

Rescue crewmen went into the water six times. They retrieved one live pilot and one fatally injured pilot. They aided in recovering two other fatalities and were unable to prevent the loss of two more.

The recovery of the fatally injured pilot mentioned above was accomplished under extreme conditions. The sling slipped off the hoist whereupon the crew chief wrapped his arms and legs about the victim and held on to the Chicago grip while the pilot hoisted him out of the water and flew a mile back to the base.

The difficult nature of a rescue operation associated with a low altitude ejection is dramatically shown by one of the unsuccessful rescue attempts. The ejection took place as the aircraft approached the end of the flight deck on catapult launch. The pilot landed close aboard the starboard side of the ship and was immediately dragged through the water by the inflated parachute. The pilot was unable to release the canopy and was dragged under the surface just as the rescue crewman approached him.

The nature of the problems of open sea helicopter rescue calls for continued emphasis on training, both of rescue crews and of potential survivors.

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Commissioned in 1946, LCDR W. H. Koenig served aboard a destroyer and a weather patrol ship before entering flight training in 1948. After designation as a naval aviator in 1950, he subsequently flew F4Us with VF-32, including a tour in Korea aboard the LEYTE, and FJs with VF-143. Koenig, a graduate of Aviation Safety Officers School Class 5, served two years with Tactical Air Control Squadron 12 before reporting to the Naval Aviation Safety Center in 1960. He was detached from NASC in February to report to the U.S. Naval Postgraduate School in the science curriculum.

CRITICAL PICKUP

"Approach for June 1961 discussed in its article on rescue problems a major difficulty stifl existing today—failure or inability of the survivor to shed his parachute in the water with consequent potential danger of (1) entanglement of survivor and rescuer in the parachute and its shroudlines and (2) the survivor being pulled under water by the deployed parachute.

"We now have the rescue seat, circular net, webbing cutters, improved hoist hook and improved training of rescue crewman, but the rescue vehicle, the HUP-2/3, limits further sophistication of methods compatible with other advances in carrier aviation. It seems logical in the pursuit of its development mission that HU-2 apply a new technique in a situation where previous techniques have brought almost certain failure.

"We're about as low as we can go in percentage of successful rescues of this type, so there's no place to go but up—chute and all!"

> CDR J. F. Uncles CO HU-2 NAS Lakehurst, N. J.

Considerable research has been conducted recently regarding a safe method of recovering a pilot from the sea who is unable to escape a deployed parachute.

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Evaluation of a proposed technique for pilot acquisition was undertaken in late 1961. During this evaluation, a 180-pound dummy wearing either a standard 26' or 28' parachute was dropped from an altitude of 300' over Toms River under varying surface wind conditions.

In all, three attempts were made using a standard rescue seat to engage the shroud lines at a point just below the parachute canopy. Two attempts were made using HUP type aircraft and a third using a Sikorsky S-62. All three pickups were successful. Though still in the evaluation and experimental stage, this method seems to be practical for use in an extreme emergency situation.

1st Pickup

On each flight, approaches were made to the canopy from numerous directions, particularly on the first flight. Surface winds for this drop were 10 knots. The canopy collapsed by itself shortly after the dummy entered the water and all efforts to inflate the canopy using rotor wash were unsuccessful. Very low hovers were also ineffective.

The pickup approach was made 90° to the wind (starboard side to the wind) and from a hover of approximately 50′ as indicated in Figure (1). The rescue seat engaged five shroud lines and the edge of the parachute canopy. Slight canopy action was experienced as the chute was hoisted until the weight of the dummy was apparent on the hoist cable. The seat was raised until the seat hook-on point was flush with the hatch level. The aircraft then proceeded to make a wide, low speed tour of





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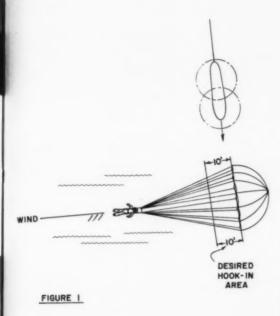
While taken during tests of a recovery net several years ago in the Neuse River near Cherry Point, the accompanying photos amply indicate the understandable concern on the part of the chopper pilots when they must approach a deployed chute, which may well billow up and oscillate into the rotor blades. The recovery methods described here, though feasible, are experimental, and should normally be used in a desperate situation when all other efforts have failed to recover a survivor because of a deployed chute. It is believed that incidents of deployed chutes being a hazard are increasing due to the greater number of low altitude ejections.





the river with the chute and dummy streaming externally beneath the aircraft. Aircraft forward speed was held to 25 knots maximum and chute action was negligible. On completion of the orbit, the dummy and chute were returned to the water by cutting the hoist cable.

It was noted on this flight and all further flights that the time of greatest danger exists as the chute canopy nears the rotor tip blast. It was therefore decided that a steep descending approach from a high hover was desirable, with a hover altitude of approximately 20' used for the engagement. In spite of light winds and warm temperatures, maximum power required was only 38"



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2nd Pickup

Surface winds for the second flight were 30 to 32 knots. The approach technique was the same; however, on this occasion it was not possible to collapse the parachute canopy and it remained deployed throughout the approach. The rescue seat engaged seven shroud lines securely. As the weight of the dummy became apparent on the hoist cable, the chute canopy ceased billowing and began to stream below the aircraft fluttering downwind. The aircraft then departed the Toms River test location with the dummy and chute streaming externally and returned to NAS Lakehurst.

The dummy and chute were lowered to Mat #1

from a high, into-the-wind hover and was handled easily on the ground by four crewmen. This same technique could be employed aboard carriers. During the delivery of the parachute and dummy to Mat #1, the "rescue" aircraft never came to a complete hover. A slight amount of forward motion was maintained throughout. The approach was normal and into a 30 kt surface wind. As the aircraft passed through approximately 50' the crewman began to lower the chute and dummy to the waiting ground crew. Slight canopy action was observed as the chute canopy drifted aft and below the rear rotor tips. By this time, however, the canopy was being handled by the ground crew and did not become a hazard. Forward aircraft airspeed for the flight was maintained at 45 to 50 knots. Here again, chute action increased with forward speed. Maximum power used for the pickup was 34"

Deck personnel must be aware that both the rescuee and the chute must be handled properly and promptly as the hoist cable is "paid out." Sufficient translation lift must be maintained throughout the high hover delivery to prevent engine damage prior to the time that the seat can be disengaged from the hoist cable.

3rd Pickup

The third pickup was made using a Sikorsky S-62 helicopter piloted by a civilian test pilot with a civilian crewmember operating the hoist. (The Coast Guard has ordered four of these as rescue vehicles, HU2-S1—Ed.) Surface winds were approximately 20 knots. The approach procedure remained the same. Again, the chute canopy remained fully deployed. This pickup was completed in less than 20 seconds from the time the dummy entered the water. Once again, the aircraft was able to orbit the river area at an airspeed of 40 knots with no difficulty. On completion, the dummy and chute were returned to the water whereupon the S-62 amphibian landed in the river and brought the chute and dummy aboard.

Summary

Many factors must be considered during the approach in order to accomplish the pickup successfully.

Wind direction and velocity is obvious by the chute movement and therefore it is easy for the rescue pilot to orient himself and approach 90° to the relative wind. The movement of the chute downwind, however, increases the difficulty of accomplishing a rescue seat and shroud line engagement near the canopy which is considered mandatory. If the engagement is made near the pilot, canopy action would be extreme. On entering the water, the dummy always floated in a horizontal

position thereby creating very little drag on the parachute as the canopy was blown downwind.

It is felt that under actual conditions the rescuee would have a "sea anchor effect" on the parachute after water entry. It must also be remembered that the high and steep approach angle to the pickup hover is necessitated by extreme canopy action which results from the rotor tip blast. High sea states were not available during the evaluation and therefore the effect on canopy action is unknown. High power settings were not required even in warm weather. To the rescue testers it appeared that the engagement of only one shroud line would be sufficient for a successful pickup since each will support 500 pounds. However, forward airspeed must be kept to a minimum while returning the streaming chute and rescuee to a ship's flight deck. Fifteen knots minimum wind over the flight deck would be desirable for the delivery.

All pickups thus far attempted have involved the use of two helicopters. The second helo hovers near the pickup aircraft and the pilot provides the pickup pilot with an accurate description of parachute canopy action throughout the hook-up and hoist operation. The success of or failure of the mission is largely dependent on the observation and information passed on by the second pilot.



Once the chute is snagged, the line is reeled in as shown and the helo is flown to the carrier or base at a relatively low speed.

Also helo deck crews must be thoroughly briefed regarding on-deck recovery procedures if the mission is to be successful. The weight of the rescuee is the only factor present which prevents the parachute canopy from rising into the rotor blades; therefore, the rescuee and the parachute must be removed from the hoist cable as a single unit.

If the rescuee were removed before the chute canopy was "trapped" by the deck crew, the results could be disastrous.

The second delivery consideration is the possibility of the relative wind inflating the canopy after it has been removed from the hoist cable and blowing it over the side before the rescuee can be removed. It is felt that assigning one crew to the canopy and one to the rescuee with specific jobs would preclude this.

Low altitude ejections are on the increase. Due to the short time pilots have to prepare for landings, and chute removal, it is thus very likely that helo pilots and surface vessels will be faced with more and more chute-complicated rescues.

A man with a deployed chute may have as little as four minutes before he goes down if he is unable to get disengaged. Use of a helo crewman has often resulted in his drowning also. Despite improvement in training and equipment the crewman just has no real platform to work from in the sea and the HUP pilot is without his vitally needed assistant. So HU-2 has developed experimentally this emergency chute snatching technique.

One final word of caution—when the chopper returns streaming chute and pilot to the carrier, only experienced helicopter handling crews should be permitted to receive him. If unexperienced handlers remove the pilot's weight from the chute lines before capturing the billowed or streaming canopy, watch out.

Old rescue hands will also wonder about the situation wherein a pilot is completely entangled in the shroud lines. In such an emergency it is of course possible that the lines will choke or smother the survivor. But the fact remains—as noted—this is an emergency method at the present time and is an alternate to what has been certain death by drowning in many, many instances of deployed chutes.

Editor's Note. A very complete booklet entitled Pilot Rescue Facts was released early in March to all fleet units, both aviation and surface. Distributed by OP-56, additional copies can be obtained from the naval aeronautical publication system. Other references include:

CNO ltr Ser 653PO5Y 8 Jan 62.

ComCruDesPac msg 202209Z (ComCruDesPac Notice 3130) is of interest, as is APPROACH, June 1961, page 4, and November 1958.

ComNavAirPac Inst. 3500/29 6 Feb 62.

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notes from your FLIGHT SURGEON

Limitations

ALL pilots should be advised not to tempt fate with human and machine limitations in order to set records, evoke awe or satisfy personal needs and desires. The borders of these limitations are so undefined that any pilot who skirts them can only be a part-time winner at best. No pilot is able to repeatedly stress the human body and machines to their limits without sometimes exceeding these limits and coming back a loser or not coming back at all.—From an MOR

Signal Mirror

AFTER ejecting from an F9F-8T, the pilot descended into an area covered with Mexican mesquite and large boulders. Discarding all his equipment except his life vest and gloves, he walked about 30 yards before realizing that walking was futile.

At this time he heard aircraft. Because of the dense and highly inflammable ground cover, he decided to use his signal mirror instead of the flares. Minutes later he saw a helicopter just disappearing beyond a ridge line. Watching the ridge line, he picked the helicopter up with his mirror signal as it came back into view. The helicopter immediately headed toward him and the rescue was accomplished.

Leaky Light

A PILOT who ejected over water from an F8U found his life vest flashlight inoperaable. Post-accident examination showed that the cap had not been screwed down tightly against the seal and water had leaked in.

Bang!

"HELICOPTER pickup was normal with the exception that I hit my head rather hard on the topside of the cargo hatch. Since I still had my hard hat on no injury resulted."—From an MOR

"Give a Wide Berth"

WHILE a calibration check was being conducted on an overhauled engine installation in an FJ-3M, a jet mechanic walked in front of the intake. He was pulled against the intake screen, pushing it aside and was sucked into the intake itself, receiving fatal injuries.

The reporting flight surgeon recommends that continued emphasis be placed on briefing of maintenance and flight personnel to "give a wide berth" to the air intake of an operating jet engine.

Double Protection

TWICE in little more than two weeks, an F8U-1 pilot was saved from serious facial injury in a canopy implosion by having his APH-5 visor down. The first time, he was flying wing when the aircraft experienced nose tuck and the canopy imploded. The plexiglas fragments struck the Hardman suspension cup hard enough to cause the mask microphone to strike his nose. His visor was shattered completely and a gash was torn in the visor cover. The second time he was descending when the implosion occurred at 25,000 feet. Fragments of plexiglas struck him on the head and shoulder but again his helmet with the visor down protected him from injury.

Dry Run Pays Off

IT was very significant and timely that this pilot had attended a briefing demonstration of the Martin-Baker seat at the morning All Pilots' Meeting on the very day this accident occurred. Consequently the ejection procedure was quite fresh in his mind.—From an MOR

Raft Advice

PILOTS who have safely ejected into the water should inflate their life jackets and prepare to enter their life rafts no matter how imminent rescue may seem.—1st MAW area Safety Council

Underwater Breathing

When braking failed to slow an A4D-1 on landing, the aircraft rolled off the runway, over a sea wall and stopped inverted in 15 feet of water. Although the pilot had failed to blow the canopy, it came off in the crash and he was able to escape. Making no attempt to use the underwater breathing feature of his oxygen equipment, he took a deep breath just before the cockpit became submerged and did not breathe again until he surfaced.

Training in all emergency procedures and correct utilization of safety and survival equipment, including oxygen systems, must be repeated and repeated. If luck had been against the pilot and the canopy had stayed with the aircraft, his life might have depended on breathing oxygen underwater until escape or rescue.

The Case of Joe Btfsplk of Gord



Occasionally, when asked how a particular aircraft accident could have been prevented a pilot will jokingly remark that "it wouldn't have happened if I'da stood in bed."

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A certain F8U pilot will attest to the fact that all things considered it would have been better if he had "stood in bed" on the night in which the alre following events occurred.

His flight was scheduled to conduct carrier controlled intercepts and in-flight refueling at night. Prior to launch the pilot had noted the fuel gauges reading abnormally high, 3900 lbs. in the main gauge and 5600 lbs. on the transfer gauge. In conducting his tail hook check he noted that there was no light in the hook handle although the plane captain signalled that the hook dropped satisfactorily. Since the hook light had a history of unreliability. squadron doctrine at this time dictated that this failure was not a downing gripe, especially if the hook dropped satisfactorily on the preflight.

After completing the intercepts the flight proceeded to the marshall point independently, not having time for the in-flight refueling. At marshall the pilot dropped the hook handle and noted a fuel state of 2900 lbs. However he also noticed 500 lbs. still remaining in the transfer system. He discounted this amount as either gauge error or unusable fuel and reported a 2400 lb. fuel state to approach control. One frequency was being used from marshall point to the deck. This made it difficult to read approach control because of the numerous aircraft on this one frequency.

He departed marshall with 1900 lbs, showing on the main gauge, making a no speed brake idle descent to conserve fuel. His pass was good but he was waved off because the LSO stated there was no approach light showing. The pilot noted that the hook handle was down but he picked it up out of the bottom detent, raised it slightly and dropped it again.

As the FSU went by the LSO platform an Aldis light check was made for the possibility of a landing gear up condition. This was not the case but

or "He Shoulda Stood in Bed"

it did show that the tail hook was not down. Therefore, the LSO instructed his talker "... have CCA inform the pilot that his hook is not down." (Because of the communications set-up the LSO only has voice contact with the pilot from the time he reports "meatball." If an aircraft bolters or is waved off, the final controller resumes control and the LSO is cut from the frequency and switched to the next aircraft in the groove.)

In this particular instance the pilot was quickly switched back to the CCA controller as he waved off. The actual transmission which the controller sent was "Check your hook." Although this transmission was not received by the pilot he had in fact

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Shortly after the waveoff the low level fuel quantity warning light came on with a gauge reading of 1400 lbs. (This was approximately 300-400 pounds above normal, but it is believed the pilot had forgotten to take into consideration his previously known high gauge reading and should have

been alerted to this possibility).

On his second approach he reported "meatball" and the LSO was given control of the UHF. Again he was advised of not having an approach light but replied that everything was down. The touchdown was made between the number three and four cross deck pendants and the bolter was logged at 1815. After the bolter the LSO advised "Lower your hook." This transmission was not received because the LSO had been cut from the pilot's frequency. Because he felt that he had landed between the wires and since he received no transmission about his hook, the pilot called the LSO in a rather vexed tone and stated, "Well, how about it, LSO? Is my hook down or not?" Since the LSO was already off the frequency CCA replied, "Put your hook down." Again he checked his hook down and then commenced a short selfcontrolled approach pattern. At the same time he transmitted a "Mayday" with a fuel state of 1000 pounds indicated and requested that a tanker stand by in event that he again boltered. When the pilot was in voice contact with the LSO on the third approach he asked the status of his hook. He was then informed that it had been up on his first two approaches. This was his first positive information on the condition of the hook—a time interval of 8 minutes from his original waveoff.

After again making a good landing and boltering the pilot was advised to clean up and conserve. At this point the pilot switched frequencies to attempt a rendezvous with the A4D tanker which

was airborne.

The rendezvous with the tanker was made expeditiously enough, but when the tanker pilot could not extend his drogue the pilot of the F8U began to get that feeling that it just wasn't his day. As

he pulled away from the tanker he was at 5000 feet, eight miles ahead of the ship with an indicated 500 pounds of fuel remaining.

After the second bolter the Air Officer ordered the barricade rigged. From the pilot's position it was more expeditious for him to make a descend-

ing right hand approach.

The first delay was encountered in attaching the barricade pendant into the connecting assembly—the clover leaf. This connection was probably damaged during the rapid removal of the barricade from its stowage area or when a tractor passed over it after it was on deck. The pendant fitting was hammered into place with a delay of two minutes.

The second delay occurred when the barricade was rigged and the order given to raise the stanchions. Two attempts were made to raise the stanchions but they could not be raised more than 40° to the vertical. As the pilot reached one mile astern in his approach he was informed that the barricade would not be ready. With an indicated 350 pounds remaining (but in all probability was 150 pounds because of the gauge error) his squadron commander ordered him to break off the approach, climb and eject ahead of the ship. Thirty (30) seconds after breaking off the approach, the barricade had been erected by tractors pulling the stanchions upright.

By now our pilot had one last "out" left—the ejection seat. Undoubtedly as he approached this evolution he felt like the gambler who has bet on "odd" the last fifteen times and has seen the ball come up "even"—the thought being there must be

something better coming up next.

As he climbed for altitude the engine surged twice but didn't flame out. When he reached 6000 feet, he slowed to 200 knots, advised the ship of his position, squawked emergency and pulled the face curtain.

When the face curtain separated from the seat he was able to observe the seat moving away from him. The automatic opening device normally deploys the parachute in three or four seconds but once again our pilot's luck was consistent—all bad. He was forced to manually pull the rip cord. No reaction was noted after the first pull and it was pulled again. This time the chute blossomed and he floated down into the water.

It is indeed fortunate that the pilot was to terminate this saga of failure with one positive statement concerning something that functioned as advertised: "... The survival equipment operated properly and in approximately ten minutes the destroyer came alongside and sent her lifeboat to rescue me."

Editor's note: Surprisingly enough the life boat did not sink while returning to the destroyer.

THREE CAME DOWN

Whether your aircraft is an A3D or an F4H, once your parachute opens after bailout or ejection, your problems are pretty much the same . . .

An A3D-2 with a crew of three was catapulted shortly after midnight for a celestial navigation flight from an attack carrier. Radio silence imposed for an impending exercise was broken moments later by the pilot stating that he was having severe control difficulties. Within seconds, he reported that the vertical fin was folded, the aircraft was nearly out of control and the crew was bailing out. Stations listening on guard frequency heard the bailout order, a short period of a depressed microphone switch, then silence.

Gunner-Navigator

The gunner-navigator pulled his helmet visor down, put his hand on the D-ring, sat on the floor and slid down the escape chute. To his surprise, twisting and turning in the slipstream was minimal although he could not orient himself in the overcast. A few seconds later, when he had lost the sound of the aircraft, he pulled the D-ring. Opening shock, "a very sudden stop," was less severe than he had expected. Scrambling back into the sling, he looked around. In the distance near the ship he saw a lighthouse. Thinking that he wouldn't be able to see it once he was in the water, he positioned various stars for guides. As he passed through a light cloud layer which he recalled was at 4 to 5 thousand feet, he briefly reviewed his survival procedures.

When he saw phosphorus shining on the surface of the water, he knew he was getting close. Once more he looked up to check the stars. By the time he looked down again, he was entering the water. He unstrapped quickly and without difficulty and pulled the toggle on one side of his life vest. Surfacing, he got his bearings and pulled the other CO₂ cylinder toggle. He did not have a life raft because he had chosen to leave it in the aircraft.

The gunner-navigator started swimming in the direction of the lighthouse. He paused and fired several tracers. No answer. After swimming a little further, he tried to ignite a night distress







signal but was unsuccessful. He put it back in his pocket to save the daysmoke portion. He saw tracers being fired. Two new lights appeared on the horizon. Assuming they were ships, he headed for them. He fired three more tracers, used his second night signal and turned on his flashlight.

He fired several more tracers. A searchlight picked him out in the water and shortly afterwards he was rescued by a motor whaleboat from one of the destroyers.

Bombardier-Navigator

As the bombardier-navigator hit the slipstream, he was twisted violently. When he was certain he was clear of the aircraft, he pulled the parachute ripcord. His parachute harness was fairly loose. The parachute opened with such a jolt that he was jammed into his leg straps with "terrific force" and saw stars. Something struck him on his leg. Reaching back to the seat pack, he felt the frayed ends of the straps that held the pararaft and realized that his pararaft and survival gear had broken loose.

The parachute harness is designed to form a sling which is passed around the buttocks and is designed to take a large part of the parachute opening forces and should be kept snug.—Nav-Aer 00-80T-52

Knowing he had no raft, he began slipping his parachute toward the lighthouse which he judged was about three miles away. He located the star Polaris and determined the approximate direction of the lighthouse so he could swim toward it if it wasn't visible from the water.

He descended through a broken cloud layer and

saw phosphorescence in the water below. With the parachute seat webbing in the small of his back instead of under him, he was unable to unsnap until he hit the water. Just before he went under water, he saw tracer bullets. Pulling the CO₂ cylinder toggles on his life vest, he surfaced and made two discoveries: he was completely entangled in shroudlines and his life vest had not inflated.

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After releasing his parachute harness, he again pulled the CO_2 toggles on his life vest but it still did not inflate. The parachute was losing air in a swirl of great bubbles and bright phosphorescence. Realizing that the shroudlines would soon pull him under, he broke out his survival knife and cut away all the lines he could feel. He located and cut away the remaining lines as they began to

38

tighten and pull him under water.

The bombardier-navigator kept his survival knife honed to a sharp edge.—MOR

Returning his knife to its sheath, he pulled out his .38, fired a tracer and turned on his life vest flashlight. Thinking that the survivor whose tracers he had seen might have a raft, the bombardier-navigator discarded his hardhat, inflated his life vest orally and began to swim in a direction between the tracers and the lighthouse. The swells were hitting him head-on. No matter whether he swam on his stomach, back or side, he got a mouthful of water from each swell. Every few minutes he stopped and fired a tracer. After about a half-hour, he saw that his life vest was empty again, probably due to his chin hitting the oral inflation valve as he swam. He decided not to reinflate his life vest for the time being since he was attempting to make headway swimming.

The oral inflation valve should have been screwed OUT—LOCKED after oral inflation. Ref. BACSEB 35-58.

Shortly afterward he saw a steady light to the right of the lighthouse. Thinking it might be a ship or a fishing boat, he fired another tracer. Soon he could see running lights and a searchlight beam. He took the flashlight from his life vest and held it at arm's length overhead where it could be seen better.

The destroyer's searchlight hit him, then turned away. He fired another tracer. By this time his legs were beginning to cramp and he became "a little impatient." As the ship came closer, he yelled, "If you love me, throw me something," and instantly, the air was full of life preservers. Just as he reached one of the life preservers, a motor whaleboat from the ship arrived and he was hauled aboard.

Here are excerpts from the bombardier-navigator's post-accident narrative:

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"I realize now that I prejudiced my chances for survival by neglecting to check the CO₂ bottles prior to launch even though the life vest had recently had a periodic check.

"If my survival knife had not been handy and sharp, the parachute would have done me in. My greatest asset was the .38 and the tracers which I later learned were seen from the flight deck of the carrier about seven miles away. My life vest would have held air if I had locked the oral inflation valve after using it.

"The physical tools of survival are only as efficient as our ability to operate them and I realize that my inadequate knowledge of the survival gear was partly to blame for my somewhat less than ideal way of handling the situation."



Survival training must be a continuous rather than a discontinuous process. It is not enough to learn these methods every six months. A constant refamiliarization with both survival material and methods together with an atmosphere of awareness of their importance will promote safety mindedness and prevent complacency towards one's equipment.—MOR

"A clear, cool head, common sense, reasonably good physical condition and equipment plus the ability to use it properly are the best assets anyone can have in a survival situation," the bombardiernavigator concludes.

Pilot

The pilot couldn't get into a position to go out the escape chute feet first so he leaned over the chute and went out head first. G-forces made this rather effortless—as if he had been catapulted out. The force of the slipstream surprised him. Everything that was loose—oxygen hose, ends of parachute straps, earphone cord—was flapping in all directions. He clamped his left arm down to bring the rip cord in close and found it with his right hand.

The parachute opened with a fair opening shock. He had a great desire to just sit there and inventory the events of the few minutes past, but he realized he would surely land in water and began to work his raft from under him.

"Although I can swim reasonably well," he commented later, "I never have felt that the open sea is my element."

He had no trouble getting back in the parachute harness but he had "a real struggle" with the raft pack. As he said afterwards, "It was almost completely dark and using the Braille system is not something we had practiced in drills."

It would be a good idea to do this. Practicing inflating life vests and life rafts and locating survival equipment in the dark is excellent life insurance.—Anymouse

The parachute was oscillating severely, but he didn't want to stop work on the pararaft to pull risers and figured the oscillations would dampen out as he floated down. Finally, he got the raft out. He pulled one side of his life vest, then started to inflate the raft.

Inflating the Mk-2 life vest during parachute descent is not a wise procedure because it may complicate removal of the parachute harness.

The night was even darker under the cloud layer than above. Partly because of the darkness and partly because of lack of familiarity with the gear, he opened the wrong end of the raft pack. All the gear came out and whipped around him like the tail of a kite, striking his face and hands and sometimes settling in his lap.

Shortly before the pilot hit the water, he found and pulled the raft's CO₂ toggle. Breathing hard by then from his exertions on the way down, he inhaled a good deal of water before surfacing. He got into the raft on his fourth try but "was in it wrong end to."

The pilot was trying to climb in the bow of the raft. After several tries he realized his error, reversed the raft and slid in easily, still wearing his parachute harness.—MOR

After resting, he reversed his position in the raft. He did not release his parachute because he intended to use it for warmth the next day. He used his hard hat to bail the raft out. Observing a tracer some distance away, he answered with a shot of his own. He took his whistle out of the knee pocket of his flight suit and blew it but heard no answering signals. When he resumed bailing, he bailed his whistle out of the raft along with the water.

At this time he saw a destroyer. He signaled an SOS with his life vest light and shortly afterward was picked up by motor whaleboat.

The investigating flight surgeon points out the following deviations from proper survival techniques:

- One instance of loose parachute harness and therefore subsequent inability to get into the sling.
- Two instances of intentionally not releasing the harness before entering the water.
- One instance of inflating the life vest while still in the parachute harness.
- One instance of unfamiliarity with the pararaft which resulted in opening the wrong end.
- One instance of misuse of the life vest. The conclusion from testing the vest is that the CO₂ cartridges were either faulty to begin with (and they had not been checked on preflight by the wearer) or they were improperly seated. Oral inflation was incomplete in this instance since the wearer did not lock the oral inflation valve with the result that he accidentally depressed it and allowed the air to leak out.

The rapid rescue of this entire crew, the flight surgeon continues, was the result of excellent preparation, good headwork and a certain amount of luck—particularly in that the tracers were seen immediately although they came from an unexpected direction. . . Mistakes were made, he says, but generally everyone and everything functioned very well.

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You wrote the caption!

THE helicopter scene on page 5 of the January 1962 APPROACH prompted the largest response yet to the You Write the Caption feature. Captions arrived from practically every type activity and from all points on the globe. Many excellent safety suggestions were included such as "Checklists were printed to be used. Those who use them do not have to explain why they didn't." Preston Willingham, AQ3, USS CONSTELLATION (CVA-64).

A special thanks to VS-29, HMR(L)163, and HS-5 for posting the picture with space for all hands to write in their caption. Space does not permit listing all captions but a sampling of those

submitted follows:

"What do you mean, "WE'?"—LT F. Adams, NATTU, NAS Jacksonville.

"I'm sure glad this one goes to PAR tomorrow."—LTJG A. M. Dundon, VA-112.

"I don't care if you are the standardization officer, that's not the way to recover from an auto."—"Yeh, yeh! I know what they teach at the RAG"—"And that's how we do the "Twist'."—Pilots & Air Crew, HS-5.

"Spot the other angel on no. 1 elevator. If we hurry we can still make Happy Hour."—LT H. O. Gerlach, VRF-32, NAS North Island.

"I don't care if you did fly it on the morning hop, I still think we should preflight it again."

—R. A. Schulze, CDR, ATC, NorVa.

"The Skipper wants to know if it can be downgraded to an incident report?"—

"There was a Commander named Bash, Who was flying his HUP quite rash,

The main rotor broke, He doubled his stroke.

Then gracefully climbed out of the crash."
—CDR S. T. Bitting, CNARestra, NAS Glenview.

"Who told YOU to kick the tires?"—"Yes, CDR. It was a bit gusty."— "The Flight Surgeon told me that the pilot only had two donuts and a cup of coffee for breakfast!"—VS-29 Readyroom.

"You're positive this is in the NATOPS Manual?"—CDR J. D. Kuser, HUP-1, NAAS Ream Field.



"And this closes out Fifty Years of Naval Aviation?!!"—CDR G. E. Hill, NARTU, NAF Andrews, Washington.

"Aw Heck, let's just forget it and let the HSSs take the Angel Duty today."—LTJG George T. McCullough, HS-11.

"Hey, Charlie, you got any money? looks like we'll have to RON."—LT. C. W. Morris, VAW-12.

"Well, Charlie, you finally hit the circle."— LCDR O. H. Cowles USCG Air Station, Miami.

"I don't care if it was the 100,000th landing, you can't use the rescue sling for a tailhook!" —A. E. Lentz, AE-1, VA-125

"Well, that didn't work. I guess we'll have to follow the procedures in NATOPS next time!"—LT V. L. Knaus, VF-101

"Just peel it, we'll eat it."— CAPT R. B. Champan, HMR(L)-163

"I told you it would never get off the ground!!"— Herb Maffen, AEM2, HU-731 Grosse Ile, NAS

"Excited!! Who was excited!?? You were excited—He was excited—! I was as tool as a tutumber!!!". . .

"What do you mean!!! should I close out our flight plan!!!"—Frank H. Monthey, AO1, NAS New Orleans.

"Let's clean that dirty windshield before we take it up again."—Preston W. Willingham, AQ3, USS CONSTELLATION (CVA-64).

there's more than meets the eye to...

AIRCRAFT REFUELING

If you are now responsible for aircraft refueling, you'll find in this article a number of rocks and shoals which should be given wide berth. Included are the principal problem areas in fuel delivery by both naval and contractor personnel uncovered by the former Assistant Inspector General of the Supply Corps, CAPT Maynard G. Stokes, and his staff. These surveys were conducted since the ground rules for integrated fuel supply operations were established by BuWeps in December 1960.

BuAer Inst. 5451.13A (Sup. 2) added to the normal Supply Department fuel farm functions those pertaining to aircraft refueling which previously were performed by station Operations or Maintenance Department personnel, except that the actual handling of the hose nozzle in refueling.

defueling and reoiling of aircraft remains the responsibility of the plane captain and crew of these departments. In most cases the transfer has been effected smoothly as directed, but there is far more to this than meets the eye. In a few words, aircraft refueling, whether by naval or contractor personnel, is a hazardous operation requiring close supervision. Observations at flight lines during aircraft refueling operations revealed many unsafe practices. Furthermore, personnel are frequently not aware of what they are doing wrong. This indicates deficiencies in both training and supervision.



Let's get specific; see if you can spot the safety hazards in these four photographs before reading the answers and pertinent references listed below:







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Deteriorated gaskets can result in hazardous vapor fuel leaks.

"Tank trucks . . . should be examined prior to loading to make sure they are suitable for transporting the products to be loaded. Equipment must be safe, roadworthy and free of leaks." (Para. F4701-3 Military Fuel Operations Handbook, Standardization H201).

3. No fire watch or extra extinguisher standing by for emergency use.

"A second operator must stand by on the wing or ladder while the clamp is being attached and during the filling operation. He will be provided with a CO₂ hand extinguisher and a second extinguisher should be readily available." (Para. 0320.7-4-g of U.S. Navy Safety Precautions, OpNav 34P1).

One nozzle has no bonding equipment; the other no grounding plug.

"Each nozzle shall have permanently attached, a flexible bonding wire of suitable length, conforming to Military Standard Drawing MS25384 with a grounding plug and a standard test clip attached." (Para. A-3-r, Part III, General Delivery Conditions for delivery under contract and BuAer Instruction 10345.5).

4. Tank fill cap must be replaced immediately after the tank is filled.

"It is important to be sure that all tank fill caps have been replaced before any of the grounding or bonding wires are removed." (Para. 8-17-n, Handbook on Aircraft Refueling, NavAer-06-5-502).

Continued

Cornerstone Guidelines

Becoming efficient in a new technical area like aircraft refueling is more difficult than it would be in a well-established field having complete detailed coverage in the BuSandA Manual. Guidelines pertaining to aircraft refueling that are important cornerstones to a good technical library include:

 Handbook on Aircraft Refueling (NavAer 06-5-502).

Military Fuel Operations Handbook (Standardization H-201).

U.S. Navy Safety Precautions (OpNav 34P1).

 General Delivery Conditions-Requirements for Fuel Delivery/Defueling/Oil Servicing of Aircraft by Contract at Naval Air Activities (Revised January 1961).

Effective instructions are listed in BuWeps Notice 5215 of 7 March 1961. Those not available can be procured from the Supply Officer, Naval Weapons Plant, Washington 25, D.C.

When all pertinent directives have been assembled and digested the next step is to get the word to personnel responsible for day-to-day aircraft refueling operations. Training classes should use these references with on-the-job observation and experience to insure thorough understanding and strict compliance with each prescribed safety practice.

BuWeps, SEQ 431, has distributed a set of transparencies and instruction guides showing correct operating procedures in aircraft refueling. Close surveillance over flight line operations will disclose

weaknesses in training effort and provide guidelines for further instruction.

Policing Operations Effectively

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BuAer Inst. NavAer 10345.1 suggests that a position of Inspector of Petroleum Products and Equipment be established or assigned to personnel already on board as collateral duty. This instruction also refers to several fires caused by deficient refueling equipment or procedures which have resulted in seriously damaging aircraft and injuring personnel.

Supply personnel occupying this inspection job are in an excellent position to prevent such casualties. They can insure safe and efficient aircraft refueling operations. They can question refueling personnel to insure both compliance with all pertinent directives and an awareness of good operating practices. These inspectors should not be so burdened with other duties that they neglect such surveillance of refueling operations. Close working associations and a free exchange of ideas with the aviation safety officer and the station safety officer will also pay big dividends.

We in the Supply Corps have assumed new responsibilities which, if not thoroughly understood and meticulously carried out, could result in "explosive" situations. Let us acquire a thorough understanding of the details required to insure safe aircraft refueling and launch an aggressive program which will win recognition of our capability in this new challenging area.

-Naval Supply Corps Monthly NEWSLETTER

Lack of Supervision

Recently, a man from a visiting squadron drove a refueling tanker under the fill pipe and proceeded to open the tanker cover and place the fill pipe in the tanker with the intent to fill it with fuel. The NAS Fire Chief intercepted the man and pointed out the following violations:

(1) The man admitted that he had no previous instruction in the operation.
(2) He drove the tanker into a hazard area before receiving a safety check

or authorization from the Supply Fuel Supervisor.

(3) There was no grounding of the tanker whatsoever.

(4) He was operating yellow equipment without a driver's permit for such equipment.

This is a case where the entire Station and its personnel were endangered because of a criminal lack of supervision.—NAS Seattle

NOTES AND COMMENTS ON MAINTENANCE guide-

SNB Crossfeed Fix

It was found that when installing the fuel cock (crossfeed valve), stock No. RM 2915-090-4561-Y120, in the JRB/SNB aircraft, improper installation could cause a new valve to leak. AN 01-90-CE (IPB SNB) page No. 250 figure No. 70 is used as a reference to illustrate this condition.

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When the crossfeed valve, item No. 63, is replaced, the fuel cock dial plate assembly, item No. 57 is not disturbed. The replacement valve may differ slightly in size from the one removed, resulting in an insufficient clearance between the plate assembly, item No. 57, and the fuel cock control yoke item No. 59. The plate assembly item No. 57, is mounted to the deck plate inside the cabin under the co-pilot's seat. The valve assembly, item No. 63, is mounted on the underside of the deck plate inside the fuselage by means of a support bracket, item No. 61. When there is no clearance between the plate assembly, item No. 57, and the control yoke, item No. 59, the valve is forced off its seat allowing fuel to leak past the valve shaft.

This condition was corrected by installing a shim between the dial plate assembly, item No. 57, and the aircraft deck plate.

-Contributed by NAS Norfolk AMD CWO F. O. Brooks

Fuel-Flare

The S2F pilots smelled gas fumes on the downwind leg. On the rollout after touchdown flames were visible coming from the outboard starboard accessory section. The pilot immediately secured the engines and brought the aircraft to a rapid stop. The copilot actuated the fuel/oil emergency cut-off switch for the starboard engine followed by the fire bottle. He observed vapor rising from the engine and the lack of flames immediately thereafter. Both pilots exited via the pilot's overhead hatch and dropped to the ground to clear the aircraft. The crash truck was abreast of the aircraft as it came to a stop but the fire was out before any of their equipment was brought into use.

Investigation revealed the retaining nut on the heater fuel line had backed off, allowing AvGas to be ignited by hot stacks resulting in engine fire

Records showed no recent maintenance was performed on this fitting or the immediate system. It is assumed the nut was not securely tightened the last time maintenance was performed and had

loosened during the ensuing flights.

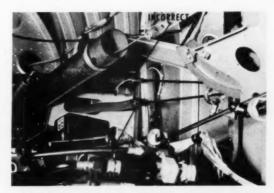
It is recommended that:

- ► Continual emphasis be placed on a complete and high quality maintenance task through proper training and supervision.
- ►Quality control assume a more active role in maintenance inspections using spot checks with tools as well as visual inspections.
- ►Pilots be made constantly aware of any change, either interim or pertinent, in the aircraft systems and how to incorporate this change into their thinking in various flight situations.

Without Comment

This accident could have been prevented if the plane director had properly stationed his men prior to moving the aircraft. It should be stressed that all directors insure that a sufficient number of men are present and stationed properly prior to the movement of any aircraft.

It should be noted that all the supervisory personnel involved in this accident were nonrated men. It is recommended that a petty officer be assigned as "Director in Charge" of moving aircraft.-From a Ground Accident Report



A4D Cables Misrouted-Binding elevator controls discovered on takeoff roll forced the A4D pilot to abort. The discrepancy came to light in time for the pilot to drop his hook and engage the field arresting gear.

During installation of the tail section the upper cable, photo above, had been misrouted outside the spring vice inside the spring as per the lower cable. Installed thusly, the cable formed a loop and caused a binding within its micarta tube housing (micarta tubes are removed for the purposes of this illustration). A4D riggers and inspectors, please note.

FLIGHT DECK APPAREL

The Catapult Bridle Arrestermen aboard the attack carrier USS LEXINGTON (CVA-16) are sporting the latest safety fashion in flight deck apparel. The arrestermen, who retrieve bridles from the arrester boom after an aircraft has been launched, have "cast away" their safety lines, and have adopted a new safety suit.

With the flight deck level 65 feet above the water, and 35 to 45 knot winds whipping over the bow the job of retrieving the bridles from the narrow 15 foot long extension from the catapults

is a very hazardous one.

In the past the arrestermen had been using the standard Navy safety line, consisting of a manila line secured around the waist. Using this method, there was always the danger of a line slipping around the man's feet or neck if he ever had the misfortune of falling over the side. With the new safety suit, this cannot happen.

The safety suit is made from surveyed flight suits, with 1,800 pound test nylon straps sewed



around the shoulders, chest, waist and legs. The latter three straps are joined together by vertical straps sewed on both sides of the suit. There are two friction buckles, one on the chest strap and one on the waist strap for adjusting the suit to proper fit. Also located on the waist strap are two "D" rings, either can be used to secure an end of a manila line. The other end of the manila line is fastened on the flight deck edge.

The idea for making the suit was that of LTJG K. D. Barton, Aviation Supply Officer, who also helped LT D. M. Herriott, Assistant Catapult Officer, in its design. The suit was made in the ship's parachute loft at a total estimated cost of \$1.50. Using new flight suits the cost would be about

\$15.00.

Lieutenant Herriott estimates that the suit is capable of withstanding a shock of 800 to 900 pounds, which is more than enough needed if the suit were given the final test.

USS LEXINGTON (CVA-16) •



The new "style in safety" aboard the LEXINGTON is "modeled" by one of the carrier's catapult bridle arrestermen.

Standing on the "boom," 65 feet above the water level, is dangerous business, and the new safety suit gives added assurance as the men retrieve the bridles following a launch.

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MURPHY'S LAW*

During the first major check on an S2F-3, four structural ribs on the port wheel were found to be deeply grooved to a depth of 1/4" and all other ribs were gouged or grooved to a lesser degree.

Investigation revealed that the outboard brake rotor had apparently been installed in such a manner that the keys did not engage the slotted sec-

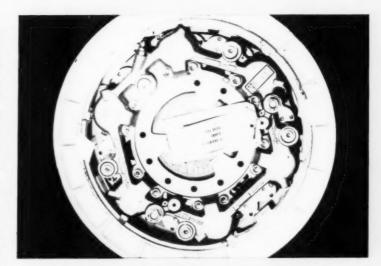
tion of the rotor disc.

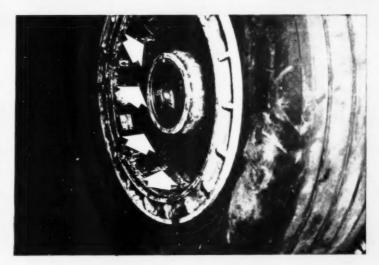
There wasn't a mechanic in the squadron who would buy that explanation. . . "Impossible! They can't be installed that way." Subsequent attempts to assemble the wheel/brake assembly with the slotted disc misaligned proved successful, although incorrect installation is more difficult than correct assembly.

Blaming the Murphy possibility on the S2F-3 was discounted when an S2F-1 wheel/brake was assembled in a like Murphy manner.

Further checks on other VS squadrons present revealed that all S2F structures mechanics were operating under the same impression that it couldn't be installed incorrectly.

The photos show the damage done by the misaligned rotor disc and the wheel/brake assembly re-installed in the Murphy manner.





^{*} If an aircraft part can be installed incorrectly, someone will install it that way!

Progressive Aircraft Rework

PAR is not and is not meant to be overhaul. PAR is physically accomplished at overhaul and repair departments of designated air stations.

That is about as close as PAR ever gets to the old concept of overhaul. It is vitally important that the fleet units, the customers, understand this. PAR is a well planned, engineeringly sound, **limited** rework of aircraft to provide maximum operational readiness and safety with a minimum expenditure of manhours and money.

Effective PAR depends on cooperative effort between fleet and O&R — O&R can not "Go it Alone". This should be evident in the fact that the fleet unit retains custody of the aircraft during PAR. The fleet can not unload unsatisfactory aircraft or components by sending them to PAR — the bad pennies will come back. As a bonus in reverse, the fleet will receive a poor PAR product if the presence of the bad equipment makes it difficult or impossible for O&R to fulfill PAR work obligations.

To reiterate — if you desire a quality PAR product, you must insure that the aircraft you send to PAR are completely configured, clean and essentially corrosion free, with all systems operating to the best of your squadrons capability. Any deviations from this must be fully spelled out on the PAR pre-induction report.

Completion of this form is a joint responsibility of your Maintenance Department and your delivery pilot.

Only about 50% of the aircraft now being received at PAR Alameda have properly completed pre-induction reports. In receipt of a basically good airplane, with an accurate condition (discrepancy) report on that aircraft at induction time, PAR can and will return to you a good, properly inspected and reworked, and a safe airplane — with less out of service time.

Fleet Units have one last responsibility to PAR. PAR work is accomplished and inspected by human beings.

Even like you and I, they at times make

mistakes. Each aircraft completing PAR receives a complete O&R Test Flight. It is also required to have a local Fleet Test flight prior to delivery. Strict compliance with this by all fleet units, utilizing only qualified test pilots, will do much to insure a high quality PAR product. If the aircraft has defects let the CFAA PAR Liaison Office know about it then — before the pilot "accepts" the aircraft and flies home.

Even after that is done the reporting custodian — the customer — has still one more obligation to PAR.

With each completed aircraft a report card is delivered. These cards must be used. Any and all discrepancies found by your maintenance department on receipt of the new PAR aircraft must be reported if you expect the system to improve. Insist that your maintenance department meet its obligation in this area.

If all parties involved carry out their respective responsibilities, PAR is an effective and safe preventive maintenance, modernization procedure.

It is not a program that an O&R can do alone.

The command that has the most to gain by a good PAR product is the operating command. Is it too much to expect and to demand that the operating commands fulfill their modest requirements in support of PAR?

If you do, your safety record will improve and your maintenance load ultimately will decrease. FAir Alameda Aviation Safety Council rag

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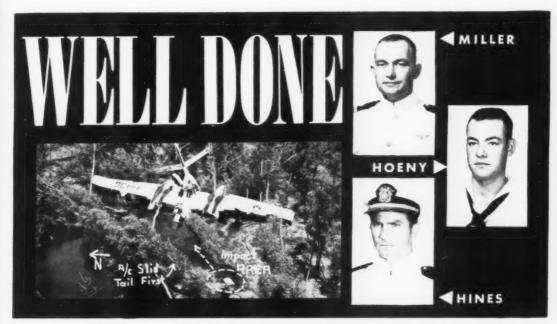
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After takeoff from a touch-and-go landing at NAAS, New Iberia, La., the pilot of an S2F-1T reported power loss on the starboard engine. The aircraft turned, continued for approximately $1\frac{1}{2}$ miles, still losing altitude slowly, hit some trees and crashed into a swamp. Aboard were an instructor and two student pilots.

With water up to his waist, one of the students. LTJC Donald Lee Miller, unbuckled his lapbelt and climbed out the starboard hatch. At this time the pilot and the other student were completely under water. In spite of his own leg injuries and a state of mild shock, LTJG Miller climbed over the branches in the surrounding swamp to try to get the instructor out since he was closer than the other student. He dove underwater and after an unsuccessful attempt to locate the instructor's harness release, he cut the instructor's shoulder straps and helmet strap with his knife. During this time he blew air into the instructor's lungs by mouth-to-mouth resuscitation to keep him from drowning. After he managed to get the unconscious man's head above water, he continued artificial respiration. He was unable to reach the student while he was holding the instructor up but observed that the student's face was out of the water and he was apparently alive and breathing. The instructor's legs were caught on something in the cockpit; LTJG Miller was unable to move him. He continued mouth-to-mouth resuscitation until rescue personnel arrived on the scene.

The SAR helicopter lowered Flight Surgeon, LT Donald E. Hines MC, USN, and Hospital Corpsman, Arthur J. Hoeny. Diving underwater, the flight surgeon freed the instructor's right leg but was unable to free his left leg which was broken. Together, the flight surgeon and corpsman moved a small tree which had broken off and was pressing down on the nose of the aircraft. Dr. Hines was then able to lift the aircraft nose which had broken on impact and was hinged. While the corpsman held the injured man up and the flight surgeon kept the nose raised, LTJG Miller again swam underwater and with considerable difficulty freed the survivor's foot. The critically injured instructor was evacuated by helicopter, Dr. Hines riding up with him in the rescue basket.

APPROACH extends a Well Done to LTJC Donald Lee Miller USN, LT Donald E. Hines MC, USN, and Arthur J. Hoeny, HM3, USN. ●

The Navy Commendation Medal has been awarded by the Secretary of the Navy to LT Donald E. Hines, MC, USN; LT Donald L. Miller, USN; and Arthur J. Hoeny, HM3, USN, for their courageous action



ever mindful of the mistakes in aviation history or we are condemned to repeat them.

1911-1962

